SOIL SURVEY OF

Worcester County, Maryland

United States Department of Agriculture
Soil Conservation Service
In cooperation with
Maryland Agricultural Experiment Station

Issued May 1973

Major fieldwork for this soil survey was done in the period 1944–64. Soil names and descriptions were approved in 1967. Unless otherwise indicated, statements in this publication refer to conditions in the county in 1966. This survey was made cooperatively by the Soil Conservation Service and the Maryland Agricultural Experiment Station. It is part of the technical assistance furnished to the Worcester Soil Conservation District.

Either enlarged or reduced copies of the soil map in this publication can be made by commercial photographers, or they can be purchased on individual order from the Cartographic Division, Soil Conservation Service, United States Department of Agriculture, Washington, D.C. 20250.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms and woodlands; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, industry, and recreation.

Locating Soils

All the soils of Worcester County are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information. This guide lists all the soils of the county in alphabetic order by map symbol and gives the capability classification of each. It also shows the page where each soil is described and the page for the woodland group in which the soil has been placed.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the discussions of the woodland groups.

Foresters and others can refer to the section "Use of the Soils as Woodland," where the soils of the county are grouped according to their suitability for trees.

Game managers, sportsmen, and others can find information about soils and wildlife in the section "Use of the Soils for Wildlife."

Community planners and others can read about soil properties that affect the choice of sites for nonindustrial buildings and for recreation areas in the section "Town and Country Planning."

Engineers and builders can find, under "Engineering Uses of the Soils," tables that contain test data, estimates of soil properties, and information about soil features that affect engineering practices.

Scientists and others can read about how the soils formed and how they are classified in the section "Formation, Morphology, and Classification of Soils."

Newcomers in Worcester County will be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the information about the county given at the beginning of the publication and in the section "General Nature of the County."

Cover: Level area in the Othello-Fallsington-Portsmouth association and typical drainage ditch. Area shown is mainly poorly drained gray Othello soils. Loblolly pines in background mark beginning of an area of very poorly drained Portsmouth soils.

U.S. GOVERNMENT PRINTING OFFICE: 1973

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402

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SOILS SURVEYED BY C. D. CROCKER, C. E. EMERY, R. FEUER, RICHARD L. HALL, F. Z. HUTTON, SR., AND M. R. NICHOLS, SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE IN COOPERATION WITH MARYLAND AGRICULTURAL EXPERIMENT STATION

WORCESTER COUNTY is on the eastern side of the peninsula that lies between the Atlantic Ocean and the Chesapeake Bay (fig. 1). It is the only county in Maryland on the Atlantic seacoast and is in that part of Maryland called the Eastern Shore. The county is bounded on the east by the Atlantic Ocean; on the south by Accomack County, Va.; on the west by Somerset and Wicomico Counties, Md.; and on the north by Sussex County, Del. The total land area is about 309,120 acres, or 483 square miles. Assateague and Fenwick Islands, barrier reefs between the Atlantic Ocean and inland bays, are part of Worcester County. Snow Hill, the county seat, is near the center of the county.

Less than half the county is farmland. The main farm enterprise is raising chickens as broilers, most of which are processed locally before they are shipped to market. Corn and soybeans for poultry feed are the main crops. Truck crops also are important to the economy of the county. They, too, generally are processed locally before being shipped to market.

Much of the county is wooded, and cash sales from standing timber are an important source of income in the county. Most of the timber is shipped out of the county. The wooded areas also are used for recreational purposes, especially by hunters and campers.

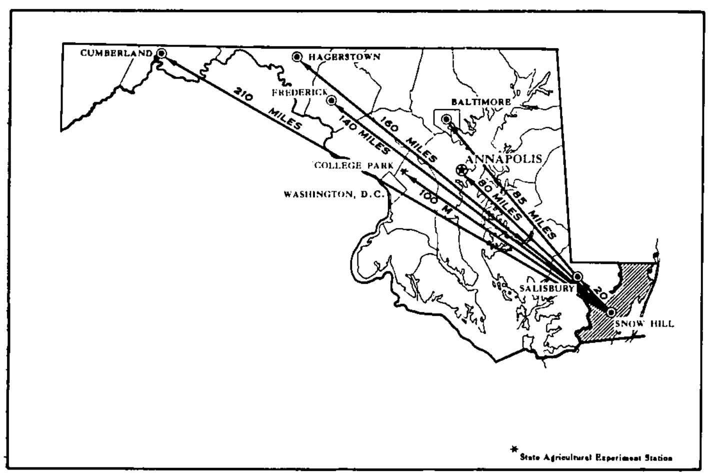

Figure 1.—**Location of Worcester County in Maryland.**

Migratory waterfowl are plentiful along the shores of the bays and in the extensive marshes along the tidal streams in the county. These birds and the fish in the Atlantic Ocean and local bays, rivers, and streams attract many sportsmen to the county.

Ocean City is the fastest developing urban area in the county. In this and other areas of the county, properties of the soils that affect their use for building sites, parks, and other nonfarm uses are of interest to community planners. Also of special concern are those properties of the soils that affect the installation of septic tanks and of filter fields for such tanks.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Worcester County, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes, the size and speed of streams, the kinds of native plants or crops, the kinds of rock, and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Lakeland and Matapeake, for example, are the names of two soil series. All the soils in the United States having the same series name

are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Lakeland loamy sand, 5 to 15 percent slopes, is one of several phases within the Lakeland series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map in the back of this publication was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil phase.

Some mapping units are made up of soils of different series, or of different phases within one series. Only one such kind of mapping unit is shown on the soil map of Worcester County, the soil complex. A soil complex consists of areas of two or more soils, so intermingled or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. The name of a soil complex consists of the names of the dominant soils, joined by a hyphen. Lakeland-Fort Mott loamy sands, 0 to 5 percent slopes, is an example of a soil complex in Worcester County.

In most areas surveyed there are places where the soil material is so rocky, so shallow, or so severely eroded that it cannot be classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Made land is a land type in Worcester County.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soil in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil. Yields under defined management are estimated for all the soils.

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in such a way as to be readily useful to different groups of users, among them farmers, managers of woodland, and engineers.

On the basis of yield and practice tables and other data, the soil scientists set up trial groups. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others; then they adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Worcester County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area, or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning the mangement of a farm or field, or for selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The eight soil associations in Worcester County are discussed in the following pages.

1. Fallsington-Woodstown-Sassafras Association

Level to steep, poorly drained to well-drained soils that have a subsoil dominantly of sandy clay loam

In this association are level to steep soils in fields and wooded areas. The soils are level and nearly level in most places, but they are steep in a few. This association occurs in a fairly continuous, long, narrow area that extends from near the northern boundary of the county to the southern boundary. In the area are the uplands west of the bays of Worcester County and most of the towns.

This association occupies about 40 percent of the county (fig. 2). About 27 percent is Fallsington soils, and about 36 percent is Woodstown and Sassafras soils in equal parts. The remaining 37 percent consists of minor soils.

The soils of this association formed chiefly in sand and fine sand containing moderate amounts of clay and silt. The surface layer generally is sandy loam. It is loam in places, however, and here the subsoil generally is thicker than where the surface layer is sandy loam.

Fallsington soils are deep, poorly drained, and level and depressional. Their surface layer is dark grayish-brown to very dark gray friable loam and sandy loam. The subsoil is mottled, friable to firm sandy clay loam.

Woodstown soils are moderately well drained and mostly level and nearly level. They are similar to Fallsington soils, but they have a yellowish-brown subsoil that is mottled in the lower part.

Sassafras soils are deep, well drained, and level to steep. Their surface layer is very dark grayish-brown to yellowish-brown loam or sandy loam. The subsoil is strong-brown to light yellowish-brown sandy clay loam.

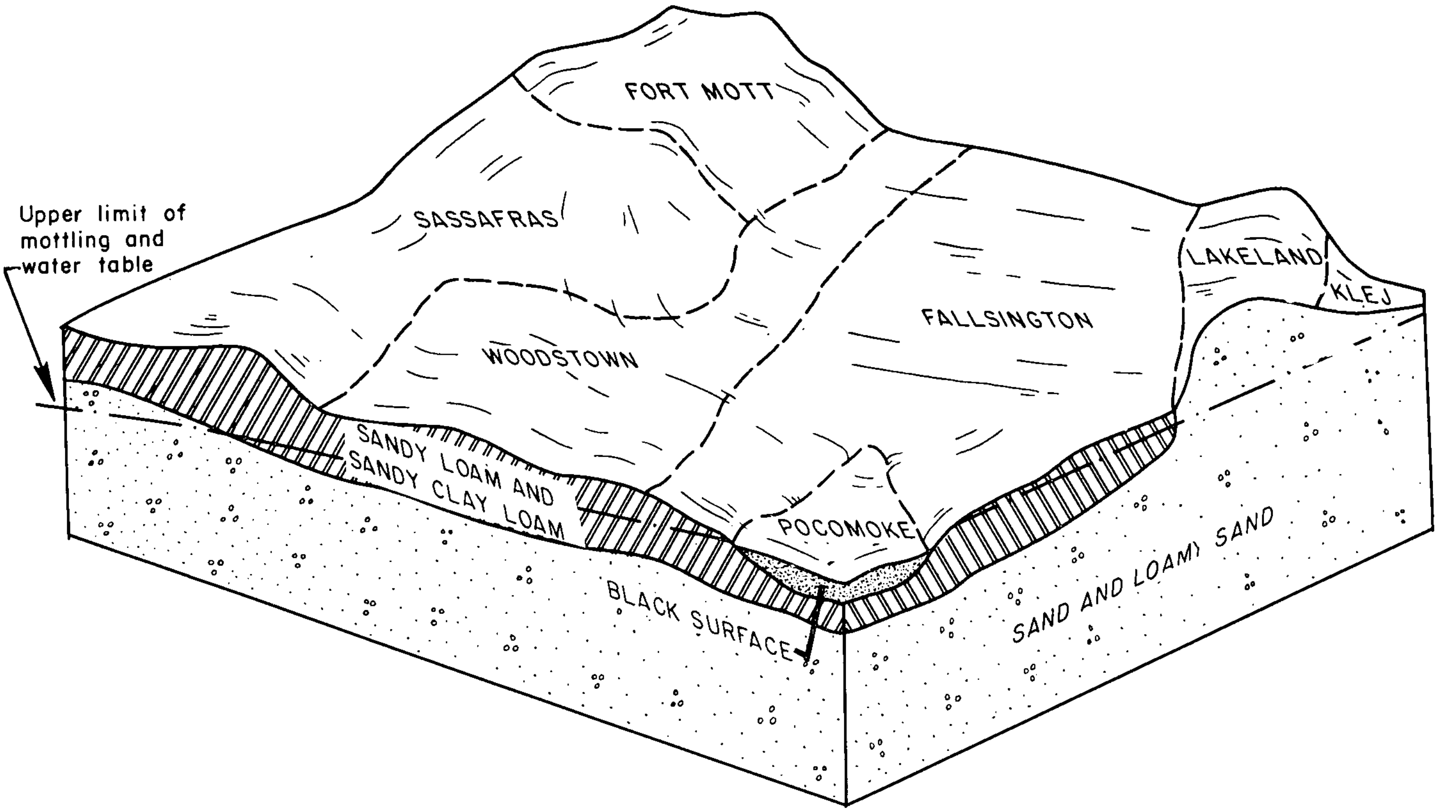

Figure 2.—**Cross section showing typical soil pattern in the Fallingston-Woodstown-Sassafras association.**

Pocomoke, Fort Mott, Lakeland, and Klej are among the minor soils in this association. Pocomoke soils are in depressions on broad upland flats; Fort Mott soils are on small ridges and along streambanks; and Lakeland soils are on sandy ridges. Klej soils are also on sandy ridges, but they are near the base of the ridges.

Most of the soils in this association are only moderately fertile, but they respond well to good management, including the use of fertilizer. If the soils are well managed, they are well suited to nearly all crops common in the county. Alfalfa and some other perennial crops on Fallsington and Woodstown soils are likely to be damaged, however, by frost.

A complete drainage system is required for Fallsington soils before they can be fully used for farming. They can be drained fairly easily by use of tile or ditches if adequate outlets are present. Once these soils are drained, they are fairly easy to manage, and erosion is not a serious hazard.

Woodstown soils generally need drainage, particularly in nearly level areas during the planting seasons and on cultivated slopes during the growing season. Erosion is a hazard.

Sassafras soils have few limitations that affect their use for farming, except in a few areas where slope and erosion limit use. These soils respond well to supplemental irrigation during prolonged dry periods. Control of erosion is needed, particularly on slopes of more than 5 percent. Runoff causes most of the erosion, but unprotected areas that have a surface layer of sandy loam are subject to soil blowing.

Because of a high water table during wet periods, Fallsington soils have severe limitations for disposing of effluent from septic tanks. Woodstown soils have moderate lmitations for this use, and Sassafras soils have slight limitations.

2. Mattapex-Matapeake-Othello Association

Level to steep, well-drained to poorly drained soils that have a subsoil dominantly of silty clay loam

In this association are deep soils that are poorly drained to well drained. These soils range from level to steep, but in most places they are level or gently sloping. Most of this association is along the western side of the Pocomoke River near Indiantown and Milburn Landing. Other areas are near Berlin and South Point. In general, Matapeake soils are at higher elevations next to the rivers and bays, Mattapex soils are farther inland, and Othello soils are farthest inland.

This association occupies about 7 percent of the county. About 60 percent is Mattapex and Matapeake soils in equal parts, and about 20 percent is Othello soils. The remaining 20 percent is minor soils.

The soils in this association formed in 24 to 46 inches of loamy material underlain by sandy material. They have high capacity for holding plant nutrients and moisture.

Mattapex soils are moderately well drained and gently sloping. Their surface layer is fine sandy loam, silt loam, or loam. The subsoil is yellowish-brown loam and silty clay loam in the upper part and light yellowish-brown

to olive and brownish-yellow silty clay loam and sandy clay loam in the lower part. Mottles in the lower part are pale brown.

Matapeake soils are well drained and gently sloping. Their surface layer is fine sandy loam or silt loam. The subsoil is dominantly light silty clay loam that ranges from yellowish brown to strong brown.

Othello soils are poorly drained and level and nearly level. Their surface layer is silt loam. The subsoil is dominantly silty clay loam that is gray to light gray and has mottles of brighter color.

Sassafras, Woodstown, Fort Mott, and Fallsington are among the minor soils in this association. Sassafras soils are next to rivers or in higher areas and are well drained. Woodstown soils occupy areas between well-drained and poorly drained soils and are moderately well drained. Both of these soils are sandier than Mattapex, Matapeake, or Othello soils. Fort Mott soils are on small ridges and along streambanks, and they are well drained. Fallsington soils are on upland flats and near the base of gentle slopes. They are poorly drained.

Mattapex and Matapeake soils are well suited to most local crops if they are properly drained. Othello soils are suited to most farm crops, but they are not suited to alfalfa or similar crops having a deep root system subject to damage by frost. Of the minor soils, the Sassafras and Woodstown are the most important for farming.

Mattapex soils have moderate limitations for residential development. Artificial drainage is needed to reduce wetness and prevent muddy lawns and yards. Basements placed in these soils must be sealed to keep moisture from penetrating. Othello soils have severe limitations as building sites because of their wetness.

Matapeake soils in this association generally have moderate limitations as sites for disposing of effluent from septic tanks. In areas of Matapeake soils that have slopes of more than 15 percent, the limitation is severe because of seepage and downslope pollution. Mattapex and Othello soils have severe limitations for this use because of a high water table during wet seasons.

3. Othello-Fallsington-Portsmouth Association

Level and nearly level, poorly drained and very poorly drained soils that have a subsoil dominantly of sandy clay loam or silty clay loam

In this association are deep, level and nearly level soils mostly in a large area that extends north-northeastward between Snow Hill and Showell. Smaller areas are south of Pocomoke City, north of Girdletree, and near Whiteburg. Only about 3 percent of this association has slopes of more than 2 percent. Erosion generally is not a hazard.

This association occupies about 21 percent of the county (fig. 3). About 65 percent is Othello soils, about 10 percent is Fallsington soils, and about 8 percent is Portsmouth soils. The remaining 17 percent is minor soils.

The soils of this association formed chiefly in loamy material that contained moderate amounts of clay and silt

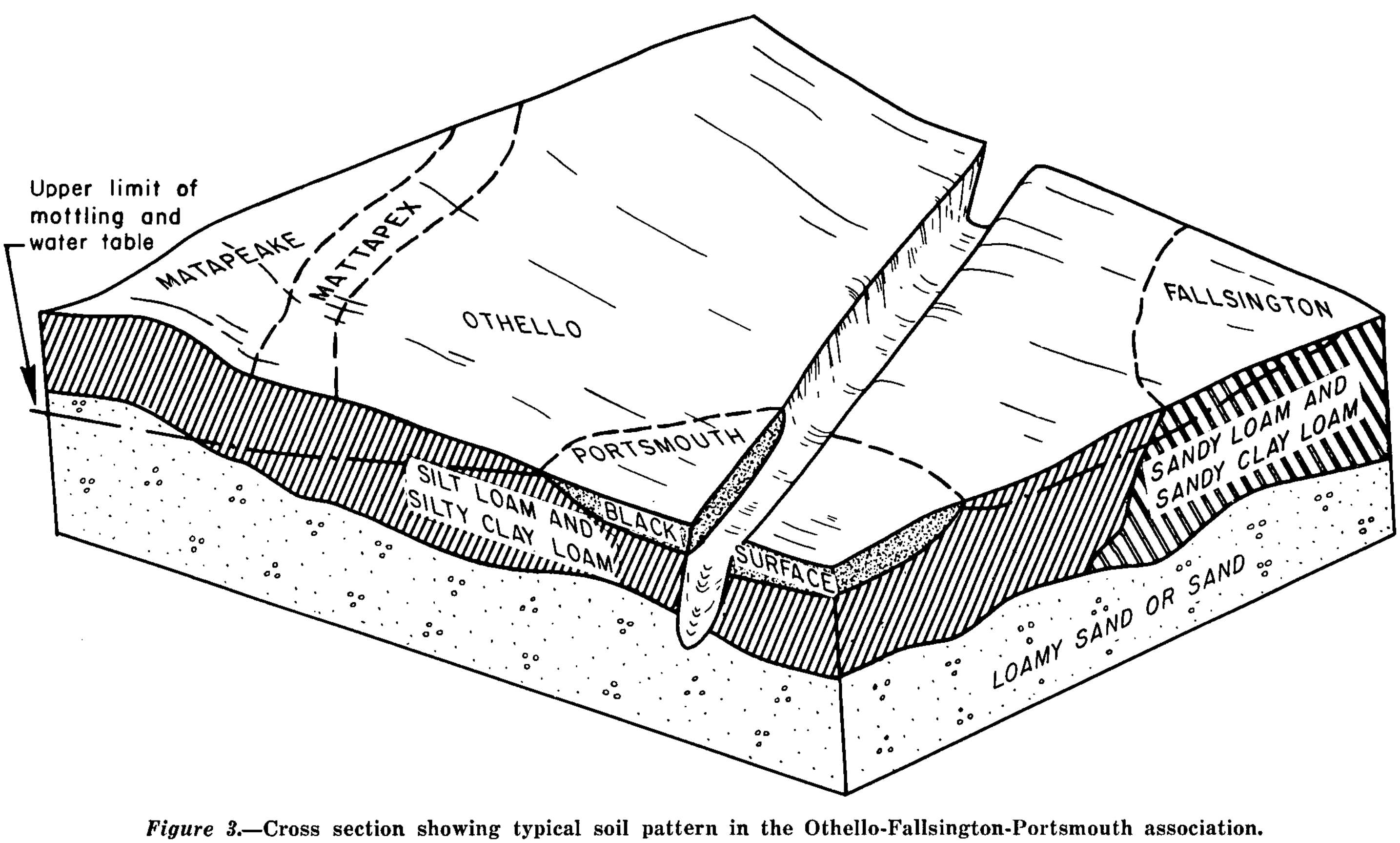

Figure 3.—**Cross section showing typical soil pattern in the Othello-Fallsington-Portsmouth association.**

and was underlain by sandy material at a depth of 20 to 40 inches. These soils generally have a mottled gray subsoil.

Othello soils are poorly drained. Their surface layer is very dark grayish-brown to olive-gray silt loam. The subsoil generally is light silty clay loam or silty clay loam.

Fallsington soils are also poorly drained. Their surface layer is very dark grayish-brown to olive-gray loam or sandy loam. The subsoil generally is friable to firm sandy clay loam. These soils generally are at a slightly higher elevation than Othello and Portsmouth soils.

Portsmouth soils are very poorly drained. Their surface layer is black sandy loam or silt loam. The subsoil generally is light silty clay loam or silty clay loam.

Matapeake, Sassafras, Mattapex, Woodstown, and Pocomoke are minor soils in this association, and one or more of these soils occur in most farmed areas. Matapeake and Sassafras soils are well drained, and Mattapex and Woodstown are moderately well drained. A few small depressional areas within areas of Fallsington soils are occupied by very poorly drained Pocomoke soils. The Pocomoke soils have a black surface layer.

A complete drainage system is required for Othello, Fallsington, and Portsmouth soils before they can be fully used for farming. (fig. 4). Once drained, these soils are suited to many crops, but most areas are used for timber. Tree growth is good or very good in both drained and undrained areas. Tile drains generally work well in these soils. In places ditches are preferable in the less permeable Othello and Portsmouth soils.

Soils in this association have severe limitations for homesites or for general residential development. In wet seasons water collects in basement excavations. Also aeration and lack of drainage limit the kinds of plants that can be grown in residential areas.

These soils have severe limitations as sites for disposing of effluent from septic tanks. The water table is high most of the year, particularly in Portsmouth soils, and the effluent moves very slowly or not at all.

4. Lakeland-Klej-Plummer Association

Level to steep, excessively drained to very poorly drained soils that are sand and loamy sand throughout

This association consists of deep, level to steep sandy soils. One long narrow area is on the east side of the Pocomoke River and contains part of the town of Snow Hill. Other areas are west of the Pocomoke River around Nassawango Creek, southwest of Whiton, and near Nazareth Church. Oval basins, bounded by very sandy

Figure 4.—**Typical landscape and characteristic drainage on soils of the Othello-Fallsington-Portsmouth association.**

rims, known locally as whale wallows, are in this association. Also in this association are dunes of very sandy soils and flats of dark and very wet soils. In general, Lakeland soils are at the higher elevations and Klej and Plummer soils are on flats.

This association occupies about 6 percent of the county (fig. 5). About 35 percent is Lakeland soils, about 20 percent is Klej soils, and about 15 percent is Plummer soils. The remaining 30 percent is minor soils.

The dominant soils in this association are low in natural fertility. Their capacity to store moisture for plant use is low or very low.

Lakeland soils are excessively drained. They generally are at a higher elevation than Klej and Plummer soils. The surface layer and substratum in Lakeland soils are loamy sand or sand. The surface layer is grayish brown, and the substratum is yellowish brown to olive yellow. In about two-thirds of the acreage of these soils, a layer of sandy loam or sandy clay loam is at a depth of 60 to 84 inches. In places water is perched on this layer.

Klej soils are moderately well drained and generally are on flats. Their surface layer and substratum are loamy sand. The surface layer is dark gray to olive gray, and the substratum is grayish brown to pale olive. The substratum is mottled in the lower part.

Plummer soils are very poorly drained to poorly drained, and they generally are on flats. Their surface layer is dark-gray to light olive-gray loamy sand, and the layers below are mottled gray or light-gray loamy sand or sand.

Fort Mott, Fallsington, Pocomoke, and Rutlege soils and the land type Muck are among the minor soils in this association. Fort Mott soils are on small ridges and along streambanks; Fallsington soils are on upland flats and near the base of gentle slopes; Pocomoke and Rutlege soils are on upland flats and in depressions; and Muck is in old ponds, stream channels, and broad shallow valleys.

Watermelons and cucumbers are grown in the small acreages of these soils that are cultivated. If the soils are well managed, they are suited to most crops common to the county. For good crop growth large amounts of fertilizer and manure are needed and supplemental irrigation should be provided during dry periods. The sandy soils require protection from erosion, and particularly from soil blowing.

Lakeland soils that have slopes of 5 to 30 percent generally have moderate limitations for use as homesites, and those that have slopes of 0 to 5 percent generally have slight limitations. Klej soils have moderate limitations for use as homesites because of a high water table. Artificial drainage reduces wetness and improves building sites on Klej soils. Plummer soils are wet and therefore have severe limitations for use as homesites.

Depending on slope, Lakeland soils have slight to severe limitations for disposing of effluent from septic tanks. Pollution of ground water and seepage of effluent from hillsides are hazards on sloping Lakeland soils. Klej soils have moderate limitations as sites for disposing of effluent from septic tanks because of a high water table during

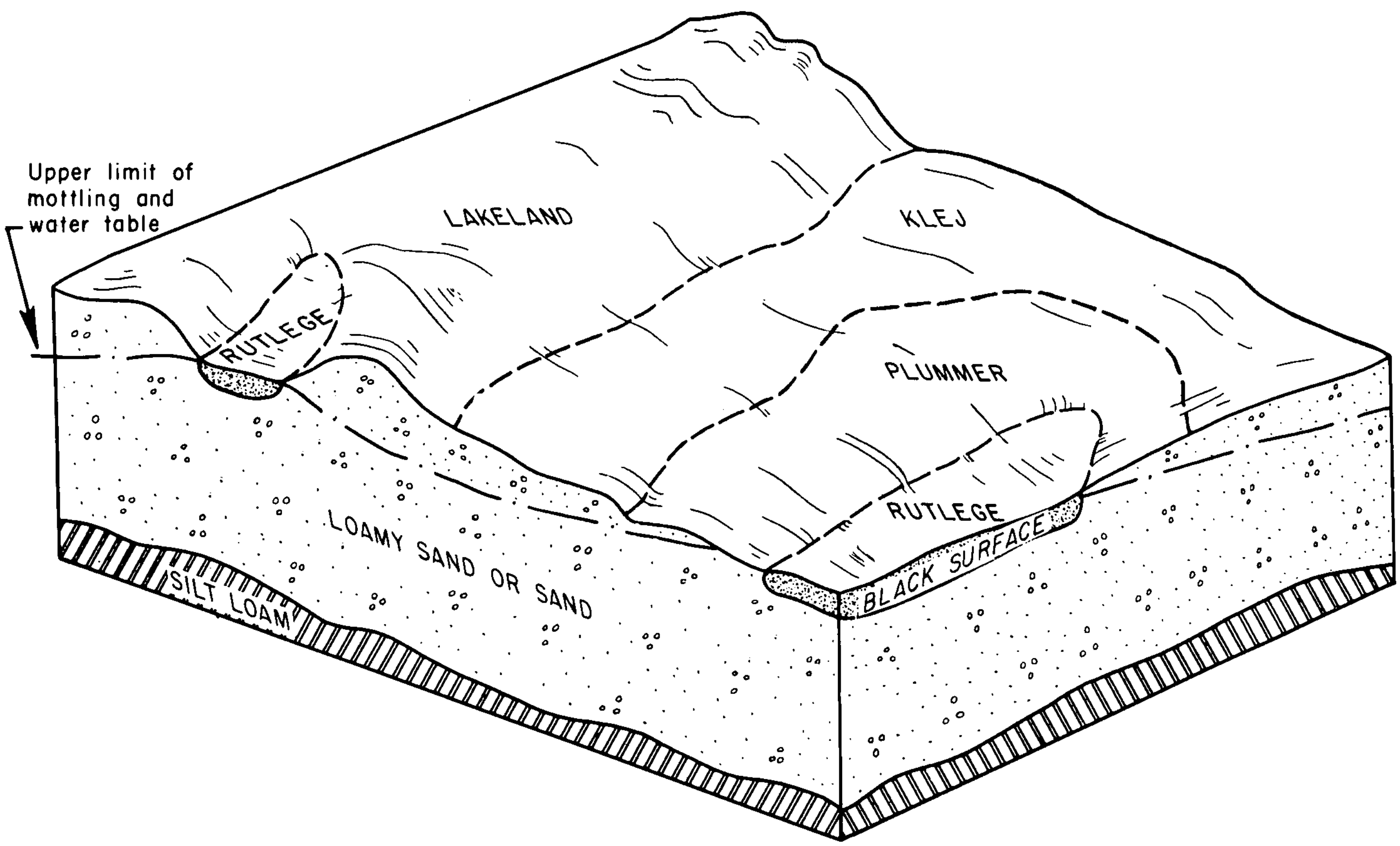

Figure 5.—**Cross section showing typical soil pattern in the Lakeland-Klej-Plummer association.**

wet seasons. Plummer soils have severe limitations for this use because of wetness.

5. Portsmouth-Mattapex-Elkton Association

Level to gently sloping, very poorly drained to moderately well drained soils that have a subsoil dominantly of plastic silty clay or silty clay loam

In this association are level to gently sloping soils that occur in a narrow area extending from the western boundary of the county eastward to near State Route 12. Slopes are less than 2 percent in 95 percent or more of the acreage and less than 5 percent in the rest of the acreage. Most of the association has been cleared and farmed in the past, but woodland is extensive today. Maple, holly, oak, and gum trees make up most of the natural vegetation. Fields that have been reforested are being invaded by loblolly pine.

This association occupies about 3,000 acres, or less than 1 percent of the county. About 60 percent is Portsmouth and Mattapex soils, and about 20 percent is Elkton soils. The remaining 20 percent consists of minor soils.

Portsmouth soils are level or slightly depressional. They are very poorly drained. Their surface layer is black or very dark grayish-brown silt loam or sandy loam. The subsoil is very dark grayish-brown to olive-yellow firm silty clay loam.

Mattapex soils are level to gently sloping and moderately well drained. These soils formed in material similar to that in which Portsmouth soils formed. Their surface layer is dark grayish-brown or very dark grayish-brown loam. The upper part of their subsoil is brown to brownish-yellow loam and silty clay loam that lacks mottles. The lower part of the subsoil is dominantly pale-olive silty clay loam.

Elkton soils are poorly drained. Their surface layer is dark-gray or grayish-brown silt loam. The subsoil is gray or light-gray silty clay and sandy clay loam.

Lakeland, Klej, Woodstown, Fallsington, and Pocomoke are among the minor soils in this association. Lakeland soils are on low ridges, Klej soils are on upland flats, and Fallsington and Pocomoke soils are in depressions. Woodstown soils are level to gently sloping.

Because they are level and their subsoil has very slow to moderately slow permeability, drainage ditches are needed to remove excess surface water from Portsmouth, Mattapex, and Elkton soils before they can be used for farming. If these soils are drained, they are suited to many crops. They are commonly used for corn and soybeans. Erosion generally is not a serious hazard.

Portsmouth and Elkton soils have severe limitations for use as homesites and residential areas. Mattapex soils have moderate limitations for those uses because of a high water table during wet periods. All three of the soils have severe limitations as sites for disposing of effluent from septic tanks.

6. Pocomoke-Rutlege-Plummer Association

Level and nearly level, very poorly drained and poorly drained soils that have a subsoil of sandy loam and sandy clay loam or are underlain by loamy sand, sand, or both

This association consists of level and nearly level, very poorly drained and poorly drained soils (fig. 6). Two areas

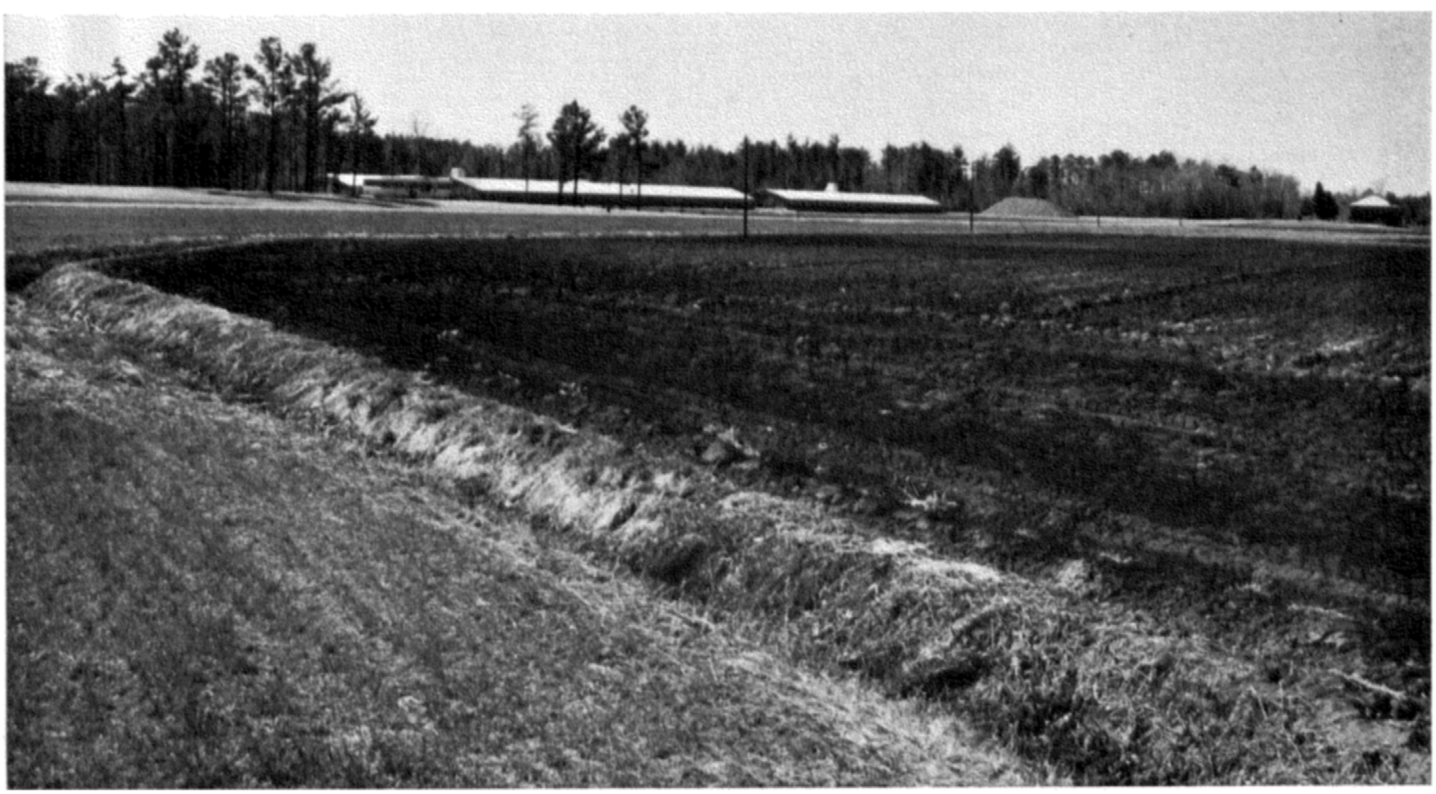

***Figure 6.*—Typical soil of the Pocomoke-Rutledge-Plummer association is in foreground. Chickenhouses in the background are on soil of the Lakeland-Klej-Plummer association.**

northwest of Snow Hill along State Route 12 are wooded. These two areas are separated by soils of association 4 along Nassawango Creek. A third area is north of Whaleysville. In most of this association slopes are less than 2 percent.

This association occupies about 12 percent of the county. About 64 percent is Pocomoke soils, and about 21 percent is Rutlege and Plummer soils in about equal parts. The remaining 15 percent consists of minor soils.

Pocomoke soils are level and nearly level and are very poorly drained. These soils formed on broad upland flats and in depressions in old sandy material containing moderate amounts of silt and clay. Their surface layer is black and dark-gray sandy loam, and the subsoil is gray, sticky sandy clay loam.

Rutlege soils are level and nearly level and are very poorly drained. These soils formed on broad upland flats and in depressions in old very sandy material that is little changed. The surface layer in Rutlege soils is black loamy sand. It is underlain by light-gray sand or loamy sand.

Plummer soils are level and nearly level and are on uplands. They are poorly drained to very poorly drained. These soils formed in material similar to that of Rutlege soils. Their surface layer is dark-gray or gray loamy sand. The underlying material is light olive-gray and light-gray loamy sand and coarse sand.

Lakeland and Klej soils, the most important minor soils in this association, are at a higher elevation than the major soils. Lakeland soils are excessively drained, and Klej soils are moderately well drained. Other minor soils are Leon and St. Johns soils, and soils in depressions that have a hardpan of sandy material in the subsoil. Leon soils are somewhat poorly drained. Their surface layer is very dark gray to light gray sandy material. St. Johns soils generally have a surface layer of mucky loamy sand.

All soils in this association except the Lakeland require artificial drainage before they can be used for farming. The soils are easily drained. The sandy soils are likely to be overdrained, though under natural conditions excess water is blocked from outlets by ridges of sand along streams. In places newly dug ditches cave in during the first year of use. The chief crops in drained areas are corn and soybeans. A few acres of cucumbers and peppers are grown each year, and the only commercially grown blueberries in the county are in this soil association.

The water table is at the surface of Pocomoke, Rutlege, and Plummer soils in winter. These soils therefore have severe limitations for use as building sites. Buildings on these soils generally are on slight knolls in areas of better drained soils. Limitations for disposal of effluent from septic tanks are severe.

7. Muck Association

Level, very poorly drained organic soils and alluvial land; subject to intermittent flooding

This soil association is on flats along the Pocomoke River and the adjoining cypress swamp. All of this association is wooded. The dominant trees are maple, gum, and sweetbay, but baldcypress grows in a few places. Most areas in this association are concave and depressional and retain all or most of the rain that falls. The soils are very wet and are extremely acid.

This association occupies about 5 percent of the county. About 80 percent is Muck, about 10 percent is Mixed alluvial land, and the remaining 10 percent is minor soils.

Muck consists of highly organic remains of plant material mixed with mineral sediment. It is black or nearly black organic material to a depth of as much as 19 feet. The muck generally is underlain by sandy material.

Mixed alluvial land is made up of various kinds of material deposited by streams. The material was picked up by streams and then was deposited on flood plains. In most places the surface layer is sandy loam, but texture of this layer varies greatly.

Pocomoke, Fallsington, and Klej soils are among soils in this association. Pocomoke soils are in depressions, Fallsington soils are on flats on uplands and near the base of slopes, and Klej soils are level or gently sloping and are on uplands.

The soils in this association have not been developed for farming. They are used as wildlife habitat and for limited farming. These soils shrink and subside on drying. They therefore have severe limitations for use as residential sites or for disposal of sewage effluent.

8. Tidal Marsh-Coastal Beaches Association

Dominantly level and nearly level, saline to brackish sediment; subject to intermittent flooding by tidal water

This association includes all of Assateague Island, Fenwick Island, and areas of Tidal marsh between the bays and the mainland. Ocean City is in this association. The soils are level and nearly level except for about 900 acres of Coastal beaches on sand dunes.

This association occupies about 8 percent of the county. About 77 percent is Tidal marsh, and about 21 percent is Coastal beaches. The remaining 2 percent is Plummer soils.

Tidal marsh has a cover of salt-tolerant plants. Exposed areas of the surface are gray or black in color. Tidal marsh is not used for farming but provides habitat for wildlife and areas for such recreational activities as fishing and hunting of waterfowl. In places areas of Tidal marsh have been reclaimed and improved for residential use.

Coastal beaches are almost bare of vegetation. The areas are not used for farming. Most of the Coastal beaches on Assateague and Fenwick Islands are east of large areas of Tidal marsh on flats. Water erosion and soil blowing are hazards. Because vegetation to hold down sand is lacking, the sand drifts and causes problems of sand removal. Movement of sand in protective barriers leaves areas exposed to high tidal storms that cut through the barriers and destroy homes and roads.

Descriptions of the Soils

This section describes the soil series and mapping units in Worcester County. Each soil series is described in considerable detail, and then, briefly, each mapping unit in that series. Unless it is specifically mentioned otherwise, it is to be assumed that what is stated about the soil series holds true for the mapping units in that series. Thus, to get full information about any one mapping unit, it is necessary to read both the description of the mapping unit and the description of the soil series to which it belongs.

An important part of the description of each soil series is the soil profile, that is, the sequence of layers from the surface downward to rock or other underlying material. Each series contains two descriptions of this profile. The first is brief and in terms familiar to the layman. The second, detailed and in technical terms, is for scientists, engineers, and others who need to make thorough and precise studies of soils. Depth to bedrock is not given in these descriptions, because all of the soils in Worcester County are underlain by unconsolidated material of great thickness, and depth to bedrock is not important in identifying the various kinds of soil.

As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Made land and Mixed alluvial land, for example, do not belong to a soil series, but nevertheless, are listed in alphabetic order along with the soil series.

Following the name of each mapping unit is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit is the capability unit and woodland suitability group in which the mapping unit has been placed. The page for the description of each capability unit, woodland suitability group, or other interpretative group can be found by referring to the "Guide to Mapping Units" at the back of this survey.

The acreage and proportionate extent of each mapping unit are shown in table 1. Many of the terms used in describing soils can be found in the Glossary at the end of this survey, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (*10*).[1]

Coastal Beaches

Coastal beaches are level to strongly sloping, sandy areas along the Atlantic Ocean. The areas extend from the Delaware State line to the Virginia State line and include Assateague and Fenwick Islands and Ocean City. In addition, a few small scattered areas are along the western shore of Chincoteague and Sinepuxent Bays. The areas range from a few feet to more than half a mile in width. Elevation ranges from sea level to about 25 feet above sea level, but it averages about 5 feet above sea level.

The soil material in Coastal beaches consists of recent marine sediment. It is made up of light-gray or white loose sand and shells that are continuously being worked and

[1] Italic numbers in parentheses refer to Literature Cited, p. 76.

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Soil	Acres	Percent
Coastal beaches, 0 to 5 percent slopes	4, 275	1. 4
Coastal beaches, 5 to 10 percent slopes	920	. 3
Elkton sandy loam	565	. 2
Elkton loam	405	. 1
Elkton silt loam	665	. 2
Fallsington sandy loam	31, 135	10. 1
Fallsington loam	9, 655	3. 1
Fort Mott loamy sand, 0 to 2 percent slopes	1, 285	. 4
Fort Mott loamy sand, 2 to 5 percent slopes	7, 085	2. 3
Fort Mott loamy sand, 5 to 10 percent slopes	1, 175	. 4
Fort Mott loamy sand, 5 to 10 percent slopes, severely eroded	200	. 1
Fort Mott loamy sand, 10 to 15 percent slopes	310	. 1
Gravel and borrow pits	535	. 2
Klej loamy sand, 0 to 2 percent slopes	6, 815	2. 2
Klej loamy sand, 2 to 5 percent slopes	1, 920	. 6
Lakeland sand, 5 to 15 percent slopes	3, 600	1. 2
Lakeland loamy sand, 5 to 15 percent slopes	2, 395	. 8
Lakeland loamy sand, 15 to 30 percent slopes	200	. 1
Lakeland sand, clayey substratum, 0 to 5 percent slopes	4, 790	1. 5
Lakeland loamy sand, clayey substratum, 0 to 5 percent slopes	7, 760	2. 5
Lakeland-Fort Mott loamy sands, 0 to 5 percent slopes	1, 735	. 6
Lakeland-Fort Mott loamy sands, 5 to 10 percent slopes	395	. 1
Leon loamy sand	2, 820	. 9
Made land	1, 195	. 4
Matapeake fine sandy loam, 0 to 2 percent slopes	3, 645	1. 2
Matapeake fine sandy loam, 2 to 5 percent slopes	5, 505	1. 8
Matapeake fine sandy loam, 5 to 10 percent slopes	505	. 2
Matapeake silt loam, 0 to 2 percent slopes	3, 275	1. 0
Matapeake silt loam, 2 to 5 percent slopes	2, 010	. 7
Matapeake silt loam, 5 to 10 percent slopes	275	. 1
Matapeake soils, 5 to 10 percent slopes, severely eroded	350	. 1
Matapeake soils, 10 to 15 percent slopes	355	0. 1
Matapeake soils, 15 to 30 percent slopes	210	. 1
Mattapex fine sandy loam, 0 to 2 percent slopes	1, 630	. 5
Mattapex fine sandy loam, 2 to 5 percent slopes	615	. 2
Mattapex loam, 0 to 2 percent slopes	3, 855	1. 2
Mattapex loam, 2 to 5 percent slopes	865	. 3
Mattapex silt loam, 0 to 2 percent slopes	4, 560	1. 5
Mattapex silt loam, 2 to 5 percent slopes	995	. 3
Mixed alluvial land	6, 655	2. 1
Muck	13, 905	4. 5
Othello silt loam	50, 135	16. 2
Plummer loamy sand	8, 980	2. 9
Pocomoke sandy loam	10, 185	3. 3
Pocomoke loam	16, 260	5. 3
Portsmouth sandy loam	905	. 3
Portsmouth silt loam	6, 825	2. 2
Rutlege loamy sand	5, 235	1. 7
Sassafras sandy loam, 0 to 2 percent slopes	7, 435	2. 4
Sassafras sandy loam, 2 to 5 percent slopes, moderately eroded	13, 560	4. 4
Sassafras sandy loam, 5 to 10 percent slopes, moderately eroded	950	. 3
Sassafras sandy loam, 5 to 10 percent slopes, severely eroded	360	. 1
Sassafras sandy loam, 10 to 15 percent slopes	440	. 1
Sassafras sandy loam, 15 to 30 percent slopes	275	. 1
Sassafras loam, 0 to 2 percent slopes	505	. 2
Sassafras loam, 2 to 5 percent slopes, moderately eroded	385	. 1
St. Johns loamy sand	2, 620	. 8
St. Johns mucky loamy sand	530	. 2
Tidal marsh	19, 270	6. 2
Woodstown sandy loam, 0 to 2 percent slopes	16, 385	5. 3
Woodstown sandy loam, 2 to 5 percent slopes	4, 010	1. 3
Woodstown loam, 0 to 2 percent slopes	2, 310	. 7
Woodstown loam, 2 to 5 percent slopes	515	. 2
Total	309, 120	100. 0

reworked by wind and waves. The sand shows no soil development and supports little vegetation. The native plants are mainly American beachgrass, tall panicum, creeping panicum, beach-heath, searocket, beach goldenrod, and poison-ivy. On older partly stabilized areas are some pine trees and waxmyrtle. In 1962 a severe storm exposed stumps remaining in brownish-gray peat and silt on Assateague and Fenwick Islands, which indicates that these areas of Coastal beaches were once wooded.

Coastal beaches are important to the economy of the county because of their value for recreational use, and they are used mainly for recreation. The areas were pastured in the past, but now only a few ponies graze on the coarse beachgrass. The barrier islands, however, provide natural defense against severe storms.

The sand in Coastal beaches is excessively drained and is very dry and salty. It is not suited to common grass or shrubs. Free water generally is at a depth between 36 and 48 inches. Sand dunes can be established and maintained to help protect the beach plains by using sand fences to trap the moving sand. Then the dunes can be fertilized and beachgrass planted (fig. 7).

A high water table severely limits use of Coastal beaches for disposal of effluent from septic tanks and thus restricts their use as homesites. Also, the low elevation and unstable sand make Coastal beaches susceptible to damage by waves and high water. Consequently, during storms much sand has been washed away from large areas of Coastal beaches (fig. 8).

***Figure 7.*—A 3-year-old stand of beachgrass on fertilized sand dunes.**

***Figure 8.*—Damage from storm to Coastal beaches at Ocean City in 1962.**

The Coastal beaches that make up most of Assateague and Fenwick Islands are bounded on the west by large level areas of Tidal marsh. In places on these islands, Plummer loamy sand separates areas of Coastal beaches and of Tidal marsh.

Coastal beaches, 0 to 5 percent slopes (CbB).—Most areas of Coastal beaches in Worcester County are in this mapping unit, and it includes all those areas in which trees are growing. In places this land type is smooth and is level or gently sloping. Homesites on Coastal beaches generally are on this land. In places the areas are flooded during severe storms. Capability unit VIIIs-2; woodland suitability group 6s21.

Coastal beaches, 5 to 10 percent slopes (CbC).—These sloping, hummocky areas are known locally as "the sand dunes." Trees do not grow in the areas, and the natural vegetation is mostly beachgrass. The water table commonly is deeper than that in Coastal beaches, 0 to 5 percent slopes, and the areas at higher elevation are less subject to damage from storms. Wind causes more movement of sand on this land than on Coastal beaches, 0 to 5 percent slopes, and the sand is more difficult to stabilize. A cover of vegetation is needed on all areas to prevent erosion by wind and waves. Capability unit VIIIs-2; woodland suitability group 6s21.

Elkton Series

Soils of this series are level or nearly level and are poorly drained. These soils occur in small areas. They formed mainly in moderately deep beds of clayey material generally underlain by loamy or sandy material. The native trees are water-tolerant oaks, sweetgum, sourgum, sweetbay, holly, red maple, and pine. The understory in wooded areas is a dense ground cover of shrubs.

In a representative profile the surface layer is about 8 inches of gray silt loam. The subsoil is light olive-gray, gray, or light-gray plastic silty clay to a depth of about 27 inches, and gray or light-gray sandy clay loam that has yellowish-brown and strong-brown mottles and streaks

to a depth of about 48 inches. The substratum is light-gray sandy loam that has yellow and yellowish-brown mottles and streaks.

Elkton soils are slow to warm in spring. They have a seasonally high water table, and unless drainage is improved, they may be covered by water during the wet part of the year. Open ditches are used to drain off excess water. Tile drainage systems are not suited because water moves slowly through the silty clay subsoil.

About half of the acreage of these soils has been cleared, and where drainage has been improved, the soils are suited to corn and soybeans. These soils are well suited to loblolly pine, and good stands of these trees are in the county. They generally are not suitable for building sites because wetness severely limits use for this purpose.

Profile of Elkton silt loam in a level cultivated area on Washington Street, extended, Snow Hill:

Ap—0 to 8 inches, gray (5Y 6/1) silt loam; weak, fine, granular structure; friable to firm, slightly plastic and slightly sticky; a few fine roots; slightly acid (limed); abrupt, smooth boundary.

B1—8 to 14 inches, light olive-gray (5Y 6/2) light silty clay; common, fine, distinct mottles of yellowish brown (10YR 5/6) and common, medium, faint mottles of pale olive (5Y 6/4); weak to moderate, fine, granular and very fine subangular blocky structure; very firm in place, plastic and slightly sticky; a few fine roots; dark silt loam in wormholes and old root channels; slightly acid; clear, smooth boundary.

B21tg—14 to 27 inches, gray or light-gray (5Y 6/1) silty clay; many, fine and medium, prominent mottles of yellowish brown (10YR 5/8) and a few, medium, faint mottles of white (5Y 8/1); moderate, coarse, blocky structure in place that parts to moderate, fine to medium, subangular blocky; very firm in place, sticky and very plastic; many fine roots between major blocks; thin, continuous, gray (5Y 5/1) clay films; medium acid; abrupt, smooth boundary.

IIB22tg—27 to 32 inches, gray or light-gray (5Y 6/1) heavy sandy clay loam; many, medium and coarse, prominent mottles of yellowish brown (10YR 5/6) and common, medium, prominent mottles of strong brown (7.5YR 5/8); moderate, very coarse, prismatic structure in place that parts to moderate, medium and thick platy and weak, fine, blocky when removed; firm in place, sticky and plastic; fine roots between prisms; thin, continuous, gray (5Y 5/1) clay films on vertical faces of prisms and faint discontinuous films on horizontal faces of plates; very strongly acid; clear, smooth boundary.

IIB3g—32 to 48 inches, gray or light-gray (5Y 6/1) light sandy clay loam; many, medium and coarse, prominent mottles of yellowish brown (10YR 5/8); weak, fine, subangular blocky structure; friable, slightly plastic and slightly sticky; a few fine roots; extremely acid; clear, smooth boundary.

IICg—48 to 60 inches, light-gray (5Y 7/1) sandy loam; many, medium, faint mottles of pale yellow (2.5Y 7/4) and common, fine, prominent mottles of yellowish brown (10YR 5/8); massive in place, but parts to very weak, medium, subangular blocky structure; very friable, slightly sticky, slightly plastic; no roots; extremely acid.

The A horizon is sandy loam, loam, or silt loam. In wooded areas or in other undisturbed areas, the A1 horizon is as much as 3 inches thick and an A2 horizon is present that ranges from 4 to 8 inches in thickness. The B21t horizon generally is clay or silty clay. In places where the surface layer is sandy loam, however, sand gives the material in the B21t horizon a gritty feel. On the average, the B21t horizon is more than 35 percent clay. In unlimed soils the B horizon is extremely acid. The C horizon ranges from loamy sand to heavy sandy loam. The solum ranges from about 30 to 40 inches in thickness, not including the B3 horizon, which is lacking in many places.

Throughout the profile the hue generally ranges from 2.5Y to 5Y, but in places the A1 and Ap horizons have a hue of 10YR. Value in the Ap horizon generally is 4 to 6, and chroma is 0 or 1. In the A1 horizon, value generally is 4 or 5 and chroma is 0, 1, or 2. Value in the A2 horizon generally is one or two units higher than it is in the A1 horizon. In the B and C horizons, value in the matrix is 5 or 6 and chroma generally is 0 or 1 but is 2 in a few places. Mottles generally occur in all horizons except the A1 and Ap. They are mostly 10YR or 7.5YR in hue, 5 or 6 in value, and 6 or 8 in chroma. In places yellowish, olive, gray, or white mottles occur that have higher value or lower chroma, or both, than specified here, and in some places hue is 2.5Y or 5Y. In dry soil the value generally is one unit higher than the value for moist soil given here.

Elkton soils in Worchester County are shallower and thinner than Elkton soils in many other areas, and their B horizon contains more sand and less silt. Also the fine-textured part of the subsoil is thinner than is given in the defined range for the series.

Elkton soils are similar to Fallsington and Othello soils in color, reaction, and degree of wetness. Their B horizon contains more clay than that in Fallsington or Othello soils.

Elkton sandy loam (Ek).—This level and nearly level soil has a surface layer of sandy loam, and throughout the profile the soil material feels somewhat gritty, but otherwise its profile is similar to that described as representative of the series.

Included with this soil in mapping are a few acres where slopes are slightly more than 2 percent. In places in these included areas erosion is a hazard.

This Elkton soil is difficult to drain because of its slowly permeable subsoil. Nevertheless, it is easier to drain and to farm than the other Elkton soils in the county. Also, it warms earlier in spring. Capability unit IIIw–11; woodland suitability group 3w13.

Elkton loam (El).—This level and nearly level soil has a loam surface layer, but otherwise its profile is similar to that described as representative of the series.

Included in mapping are a few acres where slopes are slightly more than 2 percent.

This Elkton soil is difficult to drain because of its slowly permeable clayey subsoil. It is easier to drain and cultivate than Elkton silt loam, however, and it warms earlier in spring. Capability unit IIIw–9; woodland suitability group 3w13.

Elkton silt loam (Em).—This level and nearly level soil has the profile described as representative of the series. Included in mapping are small areas where sandy material occurs at a depth of less than 20 inches.

This soil is difficult to plow when dry, and it is more difficult to work and to drain than the other Elkton soils. Hard clods form if this soil is plowed when wet, and preparing a seedbed in wet areas is difficult. The surface tends to seal over as it dries, and this results in poor emergence of seedlings and thin stands of corn and soybeans. These crops grow well, however, if the soil is drained and otherwise is well managed. Pasture and wetland trees also are well suited. Capability unit IIIw–9; woodland suitability group 3w13.

Fallsington Series

The Fallsington series consists of level or nearly level, poorly drained soils on upland flats and near the base of gentle slopes. These soils formed in old moderately coarse textured material that contains moderate amounts of silt and clay and is underlain by coarse-textured material. The native trees are loblolly pine, pond pine, water-

tolerant oaks, sweetgum, sourgum, and red maple. The understory in wooded areas is holly, sweetbay, and brier.

In a representative profile a mat of partly decayed pine needles and twigs overlies about 12 inches of very dark grayish-brown and olive sandy loam. The subsoil, about 16 inches thick, is light olive-gray and light-gray light sandy clay loam and heavy sandy loam that has mottles and streaks of light yellowish brown.

Fallsington soils warm slowly, but they are easy to work and to conserve. They respond well if large amounts of fertilizer are applied. Because these soils have a high water table and are readily penetrated by roots, they are more productive in dry years than nearby well-drained soils. Available moisture capacity is high in Fallsington soils, and natural fertility is moderate. Permeability generally is moderate to a depth of 25 inches or more, which permits the use of tile or open ditches for improving drainage. Newly constructed ditches tend to cave in, especially in the looser sandy material of the substratum.

About 40 percent of the acreage of Fallsington soils in the county is cultivated. Uncultivated areas are used for pasture, woodland, and wildlife habitat. Fallsington soils that are adequately drained, limed, and fertilized are well suited to corn, soybeans, and certain truck crops. Undrained areas are used as woodland, and some of the best stands of loblolly pine in the county are on many of the old fields. Good sites for excavated ponds are on these soils. The high water table severely limits use of these soils for many nonfarm purposes and for disposal of effluent from septic tanks.

Representative profile of Fallsington sandy loam in a wooded area between Spence and Public Landing on Public Landing Road:

O1—1 inch to 0, loblolly pine litter, partly decayed in places.

A1—0 to 3 inches, very dark grayish-brown (10YR 3/2) sandy loam; weak, medium, granular structure; friable, slightly plastic and slightly sticky; many roots; extremely acid; clear, wavy boundary.

A2—3 to 12 inches, olive (5Y 5/3) sandy loam; weak, medium to coarse, granular structure; very friable, slightly plastic and slightly sticky; many roots; very strongly acid; clear, smooth boundary.

B2tg—12 to 20 inches, light olive-gray (5Y 6/2) light sandy clay loam; common, medium, faint mottles of light yellowish brown (2.5Y 6/4); weak, fine, subangular blocky structure; friable, slightly plastic and sticky; a few roots; thin clay films; very strongly acid; clear, wavy boundary.

B3g—20 to 28 inches, light-gray (5Y 6/1) heavy sandy loam; common, medium, faint mottles of pale olive (5Y 6/4); very weak, fine, subangular blocky structure; very friable, slightly sticky; a few roots; strongly acid; abrupt, wavy boundary.

IIC1g—28 to 34 inches, light brownish-gray (2.5 6/2) loamy sand; common, medium, faint mottles of light yellowish brown (2.5Y 6/4); single grain; loose; a few roots; strongly acid; clear, wavy boundary.

IIC2g—34 to 48 inches, light-gray (5Y 7/2) loamy sand; common, medium, distinct mottles of light yellowish brown (2.5Y 6/4); single grain; loose; a few roots; very strongly acid; abrupt, smooth boundary.

IIIC3—48 to 55 inches, white (5Y 8/2) sandy loam; common, medium, prominent mottles of brownish yellow (10YR 6/6); massive; friable, slightly plastic and slightly sticky; no roots; very strongly acid.

The A horizon generally is sandy loam, but in places it is loam. The B2tg horizon normally is heavy sandy loam or light sandy clay loam, but it ranges from heavy sandy loam to heavy sandy clay loam in texture. The clay content in the A and B2tg horizon ranges between 18 and 35 percent. The IIC horizon is sand or loamy sand in places, or light sandy loam, but it is dominantly medium sand. The solum ranges from 24 to 38 inches in thickness; it is less than 30 inches thick where the B1 and B3 horizons are very thin or absent. In places a thin Cg horizon is immediately below the solum. This horizon generally is sandy loam that is structureless and lacks clay films.

In the A horizon the hue ranges from 10YR to 5Y, but it centers on 2.5Y. In plowed areas, the value in the A1 and Ap horizons generally is 3 or 4 and the chroma is 1 or 2. In the B horizon the matrix ranges from 10YR to 5Y in hue; generally is 5 or 6 in value; and is 0, 1, or 2 in chroma. Mottles in the B2tg horizon are 7.5YR to 5Y in hue, commonly are 5 or 6 in value, and range from 3 to 8 in chroma. In places in this horizon where the matrix has a chroma of 2, faint mottles occur that have a chroma of 1. The C horizon has the same range in hue as the B horizon, but the value generally is 6 or 7 and the chroma is 0, 1, or 2. Values for dry soil are about one unit higher than those given here, which are for wet soil. Mottling generally is less distinct in the C horizon than in the B horizon, and chroma is about two units lower. The B2tg horizon is strongly acid to extremely acid unless the soil has been limed.

Fallsington soils are similar to Elkton and Othello soils in color, reaction, and degree of wetness, but their B horizon is more permeable. They formed in the same kind of material as the well drained Sassafras soils, the moderately well drained Woodstown soils, and the very poorly drained Pocomoke soils.

Fallsington sandy loam (Fa).—This level and nearly level soil has the profile described as representative of the series. Included in mapping are scattered areas of a soil that has slopes of more than 2 percent. Also included are small areas of moderately eroded soil that requires simple practices for control of erosion. A few other small areas consist of soil that is more sandy than this soil or that has finer sand in the surface layer.

If this soil is drained, fertilized, and otherwise well managed, it is well suited to corn, soybeans, and some truck crops. Drainage can be provided by tile lines, which work well if properly installed. Capability unit IIIw-6; woodland suitability group 2w7.

Fallsington loam (Fg).—This soil is level and nearly level. Its surface layer contains more silt and clay and less sand than that in the soil described in the representative profile, and the sandy clay loam in the upper part of the subsoil is heavier and stickier. Also, this soil is not so easy to work nor to drain as Fallsington sandy loam.

Included with this soil in mapping are a few areas of soil that has slopes of more than 2 percent.

Fallsington loam is important to farming in the county, but it warms rather slowly in spring and needs draining. If a drainage system is provided, the soil is well suited to most crops, especially corn and soybeans. Capability unit IIIw-7; woodland suitability group 2w7.

Fort Mott Series

The Fort Mott series consists of level to moderately steep, deep, well-drained soils on uplands. These soils formed in beds of sandy sediment that contains small amounts of silt and clay. The native trees are mostly oaks and other hardwoods, though loblolly pine, shortleaf pine, and Virginia pine grow in some areas.

In a representative profile a mat of decayed leaves and twigs overlies about 3 inches of grayish-brown loamy sand. The next layer is about 21 inches of light yellowish-brown loamy sand. The upper 6 inches of the subsoil is crumbly yellowish-brown sandy loam, and the lower 7 inches is crumbly, slightly sticky, strong-brown heavy

sandy loam. Loose, light yellowish-brown loamy sand is at a depth below about 37 inches.

Fort Mott soils warm early in spring and can be worked throughout a wide range of moisture content. Roots, air, and water penetrate these soils easily. Base saturation is very low, and the ability of these soils to hold nutrients is poor. The subsoil is very strongly acid in areas that have not been limed. Fertilizer and lime are used yearly for most crops, and irrigation in dry periods benefits all crops.

About one-half of the acreage of these soils is farmed, and the chief crops are soybeans, corn, sweetpotatoes, and various truck crops. These soils are well suited to early truck crops. They have slight limitations for many nonfarm uses, but they are well suited to use as homesites and generally are suitable for septic tanks.

Profile of Fort Mott loamy sand, 0 to 2 percent slopes, in a level wooded area about three-fourths mile west of the intersection of Whiteburg Road and Dividing Creek Road, 3 miles northeast of Pocomoke City:

O1—2 inches to 1 inch, litter of leaves and twigs, mostly needles of loblolly pine.

O2—1 inch to 0, thick mat of decomposed organic material.

A1—0 to 3 inches, grayish-brown (10YR 5/2) loamy sand; structureless (single grain); loose; many roots; very strongly acid; abrupt, smooth boundary.

A2—3 to 24 inches, light yellowish-brown (2.5Y 6/4) loamy sand; very weak, fine, granular structure; very friable; common roots; strongly acid; clear, wavy boundary.

B21t—24 to 30 inches, yellowish-brown (10YR 5/6) sandy loam; weak to moderate, fine, subangular blocky structure; friable, slightly sticky and nonplastic; a few roots; a few, thin, discontinuous clay films; very strongly acid; gradual, wavy boundary.

B22t—30 to 37 inches, strong-brown (7.5YR 5/6) heavy sandy loam; weak, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; a few roots; a few, thin, discontinuous clay films; very strongly acid; gradual, irregular boundary.

C—37 to 50 inches, light yellowish-brown (2.5Y 6/4) very light loamy sand; single grain; loose; a few roots; irregular inclusions of material similar to that in B22t horizon in upper part; strongly acid.

The B2t horizon generally is sandy loam, but in places it is partly light sandy clay loam that is less than 18 percent clay. In places a thin transitional B1 or B3 horizon, or both, is present. The solum generally ranges from 24 to 40 inches in thickness. In a narrow area east of Berlin and Newark, between 2 and 3 feet of gravel has been excavated from a layer below the solum.

In the A horizon the hue is 10YR or 2.5Y. In the A1 and and Ap horizons, the value generally is 5 or 6 and the chroma is 2 to 4. In the B horizon the hue generally is 7.5YR, but in places in parts of the B horizon it is 10YR or 5YR. Value in the B horizon generally is 4 or 5, and chroma generally is 4 or 6, but it is 8 in a few places. In the C horizon hue is 2.5Y to 7.5YR, value is 5 or 6, and chroma is 3 to 6. In places hue in the C horizon is redder than specified here, chroma is higher, or there is a combination of these variations. Also, in places in the C horizon, consistence of the redder material is somewhat firmer than that of the matrix. Throughout the profile the value is one or two units higher for dry soil than the value for moist soil given here.

In places the A2 horizon is structureless. The B horizon has weak or moderate blocky structure, or weak or moderate subangular blocky structure, or both. Consistence in this horizon generally is slightly sticky, but it is sticky in places and is never more than slightly plastic.

Fort Mott soils commonly occur near Lakeland, Sassafras, and Woodstown soils. Unlike Lakeland soils, Fort Mott soils have a Bt horizon. Fort Mott soils have a thicker, more sandy A horizon than that in Sassafras and Woodstown soils. They are better drained than Woodstown soils.

Fort Mott loamy sand, 0 to 2 percent slopes (FmA).—This soil has the profile described as representative of the series. Its sandy surface and subsurface layers limit use. Special management is required to maintain fertility and content of organic matter and to reduce the hazard of soil blowing in winter. Under careful management, this soil is suited to early truck crops, soybeans, watermelons, cucumbers, and strawberries. Capability unit IIs–4; woodland suitability group 3o10.

Fort Mott loamy sand, 2 to 5 percent slopes (FmB).—In many places part of the original surface layer of this soil has been lost through water erosion. Also, in unprotected areas soil blowing has removed some of the surface layer. Cultivating and planting on the contour and growing cover crops protect the soil and help to reduce runoff and to control soil blowing. Capability unit IIs–4; woodland suitability group 3o10.

Fort Mott loamy sand, 5 to 10 percent slopes (FmC).—This soil is on small ridges and along streambanks. Slopes generally are short and irregular. In places, particularly in unprotected areas, part of the original surface layer has been removed through water erosion and soil blowing.

Except where this soil occurs within areas of other soils, few areas of it are cultivated. Nevertheless, this soil is suited to most crops. In cultivated areas practices are needed that help to control erosion and to maintain fertility. Capability unit IIIe–33; woodland suitability group 3o10.

Fort Mott loamy sand, 5 to 10 percent slopes, severely eroded (FmC3).—Most of the original surface layer and subsurface layer of this soil have been removed through erosion. Plowing has mixed browner sandy loam formerly in the subsoil with the remaining surface layer, and as a result, freshly plowed fields have a spotty appearance.

Even if all suitable practices are applied to provide protection from erosion, this soil should be used for clean-tilled crops only about 1 year in 5. Safer uses are continuous hay or pasture, sodded orchards, or woodland that is properly planted and maintained. Capability unit IVe–5; woodland suitability group 3o10.

Fort Mott loamy sand, 10 to 15 percent slopes (FmD).—This soil has a cover of trees or other vegetation. Consequently, erosion is not significant except in a few areas. Even if all suitable practices are applied to provide protection from erosion, this soil should be used for clean-tilled crops no more than 1 year in 5. Capability unit IVe–5; woodland suitability group 3o10.

Gravel and Borrow Pits

Gravel and borrow pits (Gb) includes areas from which all soil material has been removed. The mineral material remaining on the floor of the pits generally consists of piles of sand or loamy sand that in places are somewhat gravelly. The pits range from less than 1 acre to more than 30 acres in size. They generally are 2 feet deep or deeper. Generally the pits are dry most of the year, but in places they are ponded. The only large areas of accessible gravel pits are in a narrow area that extends from East of Berlin to east of Newark.

Gravel and borrow pits are sources of sand in the county. The amount of accessible gravel is limited, and in places landowners have used productive fields and woodland to obtain gravel of poor quality that extends to a depth

of only 2 or 3 feet. Abandoned pits are not suited to farming until they have been reclaimed. Such pits generally need regrading, draining, and new topsoil. In many of the abandoned pits, loblolly pine grows naturally or has been planted. In places near towns abandoned pits have been reclaimed and made into building sites. Other abandoned pits are used as ponds for farming, recreational, and wildlife purposes. Capability unit VIIIs-4; woodland suitability group not assigned.

Klej Series

The Klej series consists of level to gently sloping, deep, moderately well drained soils on upland flats. These soils commonly occur in areas as large as 300 acres. They formed in sandy marine sediment or in old alluvium. The native trees are mixed oaks, gums, red maple, loblolly pine, and Virginia pine. In many areas that once were cultivated, loblolly pine now grows in almost pure stands.

In a representative profile a mat of pine needles overlies about 2 inches of light brownish-gray loamy sand. The upper part of the substratum is similar in texture, but it is light yellowish brown in color. The lower part, beginning at a depth of about 2 feet, is light brownish-gray, loose loamy sand that is mottled and streaked with light gray and yellowish brown.

Klej soils have a seasonally high water table. They can be drained by tile or open ditches, but the banks of the ditches must be stabilized to keep them from caving in. These soils are easy to till, and they can be worked throughout a wide range of moisture content. Available moisture capacity is low, permeability is rapid, and natural fertility and content of organic matter are low. Because water moves readily through these soils, the risk of water erosion is slight. Soil blowing is a hazard, however, and a protective cover is needed on the soils. Klej soils are very strongly acid to a depth of 16 to 33 inches. Lime is needed, but care must be taken to prevent overliming. Fertilizer leaches rapidly from these soils. In dry seasons these soils are likely to be droughty, and supplemental irrigation is needed if crops of high value are grown.

Less than half the acreage of Klej soils is cultivated. Corn and soybeans are the main crops, but melons and cucumbers also are grown. The seasonal high water table limits the function of septic tank drain fields and moderately limits use of the soils as homesites. In most places the soils provide suitable sites for dug-out ponds.

Profile of Klej loamy sand, 0 to 2 percent slopes in a reforested area on south side of Voting House Road, 3 miles southwest of Whiton:

O1—2 inches to 1, litter of loblolly pine needles.
O2—1 inch to 0, mat of decomposed organic material.
A1—0 to 2 inches, light brownish-gray (10YR 6/2) loamy sand; single grain; loose; common roots; very strongly acid; clear, wavy boundary.
C1—2 to 24 inches, light yellowish-brown (10YR 6/4) loamy sand; single grain; loose; few to common roots; very strongly acid; gradual, wavy boundary.
C2g—24 to 60 inches, light brownish-gray (2.5Y 6/2) light loamy sand, light-gray (2.5Y 7/2) variegations; many, medium, prominent mottles of yellowish brown (10YR 5/8); single grain; loose; a few fine roots; strongly acid.

In cultivated areas the Ap horizon consists of the A1 horizon and part of the C1 horizon and is as much as 10 inches thick. Klej soils generally are structureless, though in places the Ap horizon has weak granular structure and in some places the C1 horizon has irregular blocky structure. These soils generally are sandy throughout, but in places an unconforming, fine-textured IIC horizon is at a depth of less than 6 feet. Klej soils generally are very strongly acid throughout, and they are extremely acid in places. In some areas, however, acidity decreases somewhat in the lower part of the C2g horizon.

In the Ap and A1 horizons, value generally is 4 or 5 and is rarely 6. Chroma in these horizons is 1 or 2. In the C1 and C2 horizons, value is 5 or 6 and chroma ranges from 2 to 4 but in places is 6. Where a IIC horizon is present, the hue in the material above the IIC horizon centers on 2.5Y. In places basic hue ranges from 10YR to 5Y in any of the horizons. Depth to mottles ranges between 15 and 27 inches. The chroma and number of mottles are high, low, or both.

Klej soils generally are near the Lakeland, Leon, and Plummer soils and grade toward those soils. Also, they generally formed in sandy sediment similar to that in which those soils formed. Klej soils are not so well drained as Lakeland soils and are better drained than Leon or Plummer soils. They lack the dark reddish-brown B horizon that characterizes Leon soils. Klej soils lack the sandy clay loam B horizon characteristic of Woodstown soils but are similar to those soils in drainage.

Klej loamy sand, 0 to 2 percent slopes (KsA).—This soil has the profile described as representative of the series. Included in mapping are a few small areas of soil where the surface layer contains slightly more silt and clay than that in the represenative profile and a few small areas where the surface layer contains slightly less.

The water table is near the surface of this soil until late in spring, and planting dates are likely to be delayed because the soil is wet and cold. The soil does not stay wet for long periods, however, and it can be easily drained by use of open ditches or tile. Capability unit IIIw-10; woodland suitability group 3s13.

Klej loamy sand, 2 to 5 percent slopes (KsB).—This soil is similar to Klej loamy sand, 0 to 2 percent slopes, but because it has steeper slopes the hazard of erosion from wind and water is slightly increased. Included in mapping are a few small areas of soil where the surface layer contains slightly less silt and clay than that in the surface layer of the representative profile.

Impeded drainage is the chief concern of management, but erosion, droughtiness, and lack of fertility are also concerns. This soil warms sooner than Klej loamy sand, 0 to 2 percent slopes, and it dries out faster. Capability unit IIIw-10; woodland suitability group 3s13.

Lakeland Series

The Lakeland series consists of level to steep, deep, excessively drained, sandy soils on interfluvial flats and dunes. The largest single area, more than 1,000 acres in size, is near the historic Old Furnace. These soils contain more sand than any other upland soil in the county. They formed in marine or old alluvial sediment made up of medium and coarse sand that is commonly underlain by finer textured material. Scrub hardwoods, predominantly oak, are the native trees. Shortleaf pine and Virginia pine are on the sandy ridges, and some loblolly pines grow in the more nearly level areas. Understory shrubs are lacking, and cactus grows on some of the very dry ridges.

In a representative profile a mat of decayed pine needles and twigs overlies about 10 inches of grayish-brown loamy sand. The substratum is light yellowish-brown and yellowish-brown very friable loamy sand to a depth of about 40

inches, and then it is pale-olive to light-gray loose sand to a depth of about 72 inches.

Lakeland soils are easy to work, and they can be worked within a wide range of moisture content. They are among the first soils in the county to warm in spring. Permeability is rapid, available moisture capacity is very low, and natural fertility is low. Soil blowing and water erosion are hazards.

Only about one-fourth of the acreage of these soils is cultivated, though much of the acreage formerly was used for crops. The main crops are watermelons, cucumbers, sweetpotatoes, and other truck crops.

Crops on these soils benefit from irrigation, and in dry seasons irrigation is likely to be needed. Large amounts of chicken manure commonly are applied. In places on the ridges, the soils are droughty. Here the soils are better suited to trees than to cultivated crops. A cover of trees also helps to prevent damage to nearby soils from blowing sand.

Many churches and cemeteries are on Lakeland soils (fig. 9). In places, however, lawns and ornamental plantings are difficult to maintain. The Lakeland soils have moderate limitations for use as homesites and as septic tank drain fields. In many places the soil material has been removed for use as road fill or in other construction.

Profile of Lakeland loamy sand, 5 to 15 percent slopes, in a reforested field on Voting House Road, about 4½ miles north of Snow Hill:

O1—1 inch to 0, litter of twigs and needles of loblolly pine.

Ap—0 to 10 inches, grayish-brown (2.5Y 5/2) loamy sand; very weak, medium, granular structure; very friable; a few roots; extremely acid; abrupt, smooth boundary.

C1—10 to 32 inches, light yellowish-brown (2.5Y 6/4) loamy sand; very weak, medium, granular structure; very friable; a few roots; strongly acid; clear, smooth boundary.

C2—32 to 40 inches, yellowish-brown (10YR 5/6) loamy sand; very weak, fine to medium, granular structure; very friable; a few roots; very strongly acid; abrupt, wavy boundary.

C3—40 to 52 inches, pale-olive (5Y 6/3) sand; a few thin layers of light yellowish brown (2.5Y 6/4); single grain; loose; strongly acid; clear, smooth boundary.

C4g—52 to 72 inches, light-gray (5Y 7/1) sand; structureless (single grain); loose; strongly acid; abrupt, wavy boundary.

Figure 9.—**Church and graveyard on a ridge made up of Lakeland loamy sand, 5 to 15 percent slopes.**

In undisturbed areas a thin A11 horizon and a somewhat thicker A12 horizon are present. The A1, C1, and C2 horizons are sand or loamy sand. In places a layer of sandy loam or sandy clay loam is at a depth between 60 and 84 inches.

Throughout the profile hue generally is 10YR or 2.5Y, but in places it is 5Y at a depth of more than 3 feet. In the A horizon value ranges from 3 to 6 and chroma is 1 or 2. In undisturbed areas value is lower in the thin A11 horizon than in other layers in the A1 horizon. In the C1 horizon, value is 5 or 6 and chroma generally is 4 to 6 but is 8 in places. The other layers of the C horizon have a color similar to that in the C1 horizon, but in places value is higher and chroma generally is lower.

Lakeland soils formed in the same kind of material as Klej, Leon, Plummer, Rutlege, and St. Johns soils, but they are better drained than those soils. In places areas of Lakeland soils are intermingled with areas of Fort Mott soils. Lakeland soils, however, lack the slightly sticky sandy loam in the B horizon that is typical of Fort Mott soils.

Lakeland sand, 5 to 15 percent slopes (LaD).—This soil consists mostly of sand. It contains little or no silt or clay and is among the most droughty soils in the county. The areas are known locally as "sand ridges," "sugar sand," or "dead soil." Undergrowth is sparse on this soil.

Low fertility and droughtiness make this soil poorly suited to farming. Limitations for use as building sites are moderate, but the soil is well suited to poultry buildings if the slope is not excessive. Many sand pits are in this soil. In addition, where the soil is near farm buildings, a few trench silos are in this soil. Capability unit VIIs–1; woodland suitability group 3s14.

Lakeland loamy sand, 5 to 15 percent slopes (LkD).—This soil has the profile described as representative of the series. Irregular slopes give some areas a dunelike appearance.

This soil is suitable for use as woodland and as wildlife habitat. It is cultivated only if it occurs within areas of other soils that are used mainly for watermelons and cucumbers. Areas not protected by vegetation are subject to soil blowing and water erosion. Capability unit VIIs–1; woodland suitability group 3s14.

Lakeland loamy sand, 15 to 30 percent slopes (LkE).—Most areas of this soil have a cover of Virginia pine and shortleaf pine. Included in mapping are a few small areas of soil that has a surface layer of sand that contains little or no silt.

This soil is suitable for use as woodland and as wildlife habitat. Capability unit VIIs–1; woodland suitability group 3s15.

Lakeland sand, clayey substratum, 0 to 5 percent slopes (LlB).—The surface layer of this soil contains more sand and less silt and clay than that in the profile described as representative of the series. A sandy loam or sandy clay loam layer at a depth of about 60 to 84 inches in this soil helps to reduce the drought hazard. Because the surface layer is mainly sand, this soil is known locally as "sugar sand" or "dead sand."

This soil is poorly suited to crops, and it requires special management if crops are grown. Melons, cucumbers, strawberries, and other special crops are grown on a small acreage. Repeated small applications of fertilizer during the growing season are needed for good plant growth. Erosion generally is not a serious hazard, but in areas not protected by vegetation dry soil blows readily. Capability unit IVs–1; woodland suitability group 3s14.

Lakeland loamy sand, clayey substratum, 0 to 5 percent slopes (LmB).—This soil has a layer of sandy loam

or sandy clay loam at a depth of about 60 to 84 inches, but its profile otherwise is similar to that described as representative of the series. The layer reduces the drought hazard, and the soil is therefore better suited to most crops than other Lakeland soils.

This soil is used extensively for truck crops and other kinds of crops. Repeated small applications of fertilizer are generally needed during the growing season for sustained plant growth. Large areas not protected by vegetation are subject to soil blowing if the surface is dry. Capability unit IIIs–1; woodland suitability group 3s14.

Lakeland-Fort Mott loamy sands, 0 to 5 percent slopes (LoB).—This complex is about 60 percent Lakeland soil and about 40 percent Fort Mott soil. Each of these soils has a profile like that described as representative of its series.

Included in mapping are areas where the soil has a clayey substratum that retains moisture at a depth of about 5 to 7 feet.

The soils in this complex are somewhat droughty and are low in fertility. Early truck crops commonly are grown, but special management is needed to maintain fertility and to conserve moisture. Capability unit IIIs–1; woodland suitability group 3s14.

Lakeland-Fort Mott loamy sands, 5 to 10 percent slopes (LoC).—This complex is about 75 percent Lakeland soil and about 25 percent Fort Mott soil. Each of these soils has a profile like that described as representative of its series. In places a clayey substratum occurs at a depth of more than 7 feet. Protection from soil blowing is needed.

These soils are moderately well suited to loblolly pine and other trees, but they are poorly suited to crops. In many places it is economically feasible to grow loblolly pine for timber on these soils. Capability unit IVs–1; woodland suitability group 3s14.

Leon Series

The Leon series consists of level or nearly level, somewhat poorly drained to poorly drained, sandy soils that have a cemented hardpan in the subsoil known locally as "Indian hearth" or "ironstone." These soils formed in thick beds of very strongly acid sand on ridges about 6 to 12 inches higher than surrounding soils and in pockets about 10 to 20 acres in size. The native trees are loblolly pine, pond pine, and wetland hardwoods, particularly oaks, gums, and red maple. Almost pure stands of loblolly pine grow in some reforested areas. The undergrowth in wooded areas is chiefly greenbrier and teaberry.

In a representative profile a mat of partly decayed leaves and twigs overlies about 6 inches of very dark gray loose loamy sand. The subsurface layer is about 8 inches of gray loose loamy sand. The upper part of the subsoil is about 3 inches of very dark gray loose loamy sand. The middle part, beginning at a depth of about 17 inches, is dark reddish-brown to very dusky red, hard, cemented sand. The lower part of the subsoil is brownish-gray loose loamy sand that extends to a depth of about 50 inches. It has a few streaks of brownish yellow and yellow. The underlying material is light-gray loose fine sand.

Leon soils are naturally too wet, too acid, and too low in fertility for most crops, and where they occur in large areas they generally are not farmed. They are cultivated, however, where they occur in spots surrounded by better soils. If the Leon soils are drained, they hold so little moisture above the hardpan that plants are damaged by lack of moisture in dry periods. Most crops on these soils grow poorly, though blueberries grow well if the level of ground water is controlled. Lime and fertilizer leach out rapidly and must be added frequently. Soil blowing is a hazard in areas that are cleared and drained. The high water table severely limits use of the soils for homesites and for septic tank drain fields.

Profile of Leon loamy sand in an area of loblolly pines ¾ mile west of Forest Lane Road and 3¾ miles northwest of Snow Hill:

O1—2 inches to 0, mat of undecomposed leaves and twigs; many roots.

A1—0 to 6 inches, very dark gray (N 3/0) loamy sand; very weak, fine, granular structure to single grain; loose to very friable; many roots; extremely acid; clear, smooth boundary.

A2g—6 to 14 inches, gray (N 5/0) loamy sand that contains coarse grains in places; single grain; loose; a few roots; strongly acid; clear, smooth boundary.

B1h—14 to 17 inches, very dark gray (5Y 3/1) loamy sand; single grain; loose; many roots; extremely acid; clear, wavy boundary.

B2h—17 to 38 inches, dark reddish-brown (5YR 2/2) or very dusky red (2.5YR 2/2) loamy sand; weakly cemented to strongly cemented material that crushes to subangular blocks of all sizes; slightly hard to extremely hard when dry, friable to firm when moist; a few roots and many old root channels; extremely acid; diffuse, irregular boundary.

B3g—38 to 50 inches, light brownish-gray (2.5Y 6/2) loamy sand; bright stains of brownish yellow (10YR 6/8) and reddish yellow (7.5YR 6/8) along old root channels; single grain; loose; a few large roots; very strongly acid; diffuse, smooth boundary.

Cg—50 to 70 inches, light-gray (5Y 7/2) fine sand; a few streaks of pale brown (10YR 6/3); single grain; loose; a few large roots; very strongly acid.

In places in cultivated areas, the surface layer of these soils appears to be almost white when dry. In these areas the A1 horizon generally is thinner, the A2 horizon generally is thicker, and the B2h horizon is thinner than that described in the representative profile. The Bh horizon is extremely acid. The hardpan in this horizon varies considerably in thickness and hardness. It generally appears continuous but is not uniformly cemented, and in spots is soft enough for roots to penetrate fairly easily. A nonconforming IIC horizon of sandy loam to sandy clay loam occurs in places at a depth of less than 6 feet.

Leon soils formed in the same or in nearly the same kind of material as the excessively drained Lakeland soils, the moderately well drained Klej soils, the poorly drained to very poorly drained Plummer soils, and the very poorly drained Rutlege and St. Johns soils. The soils of the Leon and St. Johns series have a Bh horizon cemented with organic matter, but Leon soils are better drained and their A1 horizon is thinner and not so dark colored as that in the St. Johns soils. Also, the Bh horizon characteristic of the Leon soils is lacking in the Klej and Plummer soils.

Leon loamy sand (Ls).—This level and nearly level soil is the only Leon soil mapped in the county. Included in mapping are some areas of soil where the surface layer contains less sand and more silt than that in the representative profile. Also included are many small areas where the soil is slightly better drained or more poorly drained than this soil. Capability unit Vw–5; woodland suitability group 2w7.

Made Land

Made land (Ma) consists of areas where the soil material has been so disturbed or so modified by grading or filling that it cannot be classified. Most of these areas have been built up with fill material or are areas from which the soil material has been removed by leveling or by other mechanical means. The soil material is mostly low in natural fertility and very strongly acid.

It is likely that the acreage of Made land is increasing in the county. At present the largest acreages of Made land are in areas at Pocomoke City and Ocean City. The fill material for the acreage at Ocean City was pumped from Sinepuxent Bay and then covered by finer material trucked in from the mainland. Most of Made land is used for residences, industrial buildings, and other nonfarm purposes. Before a site is used for any purpose, an investigation at the site is needed. Capability unit and woodland suitability group not assigned.

Matapeake Series

The Matapeake series consists of level to steep, well-drained soils on uplands that have a moderately fine textured and medium-textured subsoil. Because of the color of their subsoil, they are known locally as "red clay bottom" soils. Some areas of these soils are more than 75 acres in size and generally include small areas of Mattapex soils in depressions. Most areas are surrounded by areas of Othello soils. The native trees are upland hardwoods, but most areas have been cleared and cultivated.

In a representative profile a plow layer of dark grayish-brown silt loam about 9 inches thick overlies a subsurface layer of yellowish-brown silt loam about 5 inches thick. The subsoil is dark-brown to yellowish-brown, firm, sticky silty clay loam that is strongly acid. The substratum, at a depth of about 40 inches, is friable to firm yellowish-brown sandy loam that grades to brownish-yellow loose loamy sand.

Matapeake soils have high available moisture capacity. They hold lime and fertilizer well. In most cultivated areas, because of heavy liming in the past, reaction is no more than slightly acid in the surface layer and strongly acid in the subsoil.

These soils are well suited to farming, and crops that need a long growing season grow well on them. Except for the steep slopes, areas of Matapeake soils are cultivated. Corn, soybeans, hay, and a few kinds of truck crops are the chief crops. These soils also are suited to nonfarm uses. They have good drainage throughout the year, make good homesites, and are well suited to lawns and gardens.

Profile of Matapeake silt loam, 0 to 2 percent slopes, 1½ miles northwest of Snow Hill in a cultivated area on Snow Hill-Whiton Road, about 1 mile north of its intersection with Route 12:

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; very weak, fine, granular structure; friable, slightly sticky and slightly plastic; many roots; neutral (limed); abrupt, smooth boundary.

A2—9 to 14 inches, yellowish-brown (10YR 5/4) silt loam; weak, medium, granular and weak, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; common to many roots; dark grayish-brown (10YR 4/2) silt in worm holes and root channels; slightly acid; clear, smooth boundary.

B21t—14 to 26 inches, brown or dark-brown (7.5YR 4/4) light silty clay loam; moderate, fine, subangular blocky structure; firm, sticky and plastic; many roots; thin, almost continuous clay films; medium acid; clear, smooth boundary.

B22t—26 to 33 inches, yellowish-brown (10YR 5/4) light clay loam or silty clay loam; moderate, fine, subangular blocky structure; firm, sticky and plastic; a few roots; continuous clay films; strongly acid; clear, smooth boundary.

IIB23t—33 to 40 inches, yellowish-brown (10YR 5/6) light sandy clay loam; weak, fine, blocky structure; friable, slightly sticky and slightly plastic; a few roots; thin, discontinuous films on vertical faces; strongly acid; clear, smooth boundary.

IIC1—40 to 48 inches, yellowish-brown (10YR 5/6) sandy loam; massive to very weak, fine, subangular blocky structure; friable to firm, slightly sticky and very slightly plastic; a few roots; very strongly acid; clear, smooth boundary.

IIC2—48 to 65 inches, brownish-yellow (10YR 6/6) loamy sand; single grain; loose; a few roots; strong-brown (7.5YR 5/8) and white (2.5Y 8/2) sand in places; slightly acid.

The solum ranges from 28 to 40 inches in thickness. The Ap horizon is fine sandy loam, loam, or silt loam. The B2t horizon generally is light silty clay loam, but in some areas it is clay loam or heavy silt loam. In other areas this horizon is sandy clay loam that is transitional to, or part of, the underlying unconforming sandy material. In places the IIB23t horizon is lacking and the B22t horizon rests upon the IIC1 horizon. The unconforming horizon is sand or sandy loam.

In the Ap horizon color ranges from dark grayish brown to yellowish brown. In areas where the B horizon is yellowish brown or dark yellowish brown, some part of this horizon is brown or strong brown. The IIC horizon generally is brownish yellow, but in places it is yellowish brown or reddish yellow. In places dry colors are one unit higher in value than indicated for moist material in the representative profile.

Matapeake soils formed in the same or in nearly the same kind of material as the moderately well drained Mattapex, the poorly drained Othello, and the very poorly drained Portsmouth soils. Matapeake soils are similar to Sassafras soils in drainage, color, and morphology, but their solum contains more silt and less sand than that of Sassafras soils. Matapeake soils are also similar to Fort Mott soils in color and morphology, but they have less sand throughout the solum.

Matapeake fine sandy loam, 0 to 2 percent slopes (MdA)—This soil has a surface layer that contains less silt and more fine sand than that in the profile described as representative of the series. The plow layer generally is crumbly, and this soil can be worked throughout a wider range of moisture content than Matapeake silt loam.

This soil is one of the best in the county for farming. It is nearly level and is subject to little or no erosion. Under good management it has no important limitations. Capability unit I–5; woodland suitability group 3o10.

Matapeake fine sandy loam, 2 to 5 percent slopes (MdB).—The profile of this soil is similar to that described as representative of the series, except that its surface layer contains less silt and more fine sand and in places has been thinned by erosion. In places deep plowing turns up part of the yellowish-brown subsoil.

This soil is suited to practically any use. If it is well protected, it can be cultivated much of the time. Capability unit IIe–5; woodland suitability group 3o10.

Matapeake fine sandy loam, 5 to 10 percent slopes (MdC).—This soil is more susceptible to erosion than less sloping Matapeake fine sandy loams. Included in mapping are some areas that are severely eroded.

If this soil is protected from erosion, it can be used for most crops commonly grown in the county. Capability unit IIIe–5; woodland suitability group 3o10.

Matapeake silt loam, 0 to 2 percent slopes (MeA).—This soil has the profile described as representative of the series. It is one of the best soils in the county for farming, and it has few limitations in use. This soil cannot be worked throughout so wide a range of moisture content, however, as Matapeake fine sandy loam, 0 to 2 percent slopes. In a few areas the soil has been compacted by heavy machinery that was used when the soil was too wet. Capability unit I–4; woodland suitability group 3o10.

Matapeake silt loam, 2 to 5 percent slopes (MeB).—In this soil the subsurface layer is somewhat thinner than that in the profile described as representative of the series. About 42 percent of the acreage is moderately eroded. In cultivated areas practices are needed to prevent further erosion. Capability unit IIe–4; woodland suitability group 3o10.

Matapeake silt loam, 5 to 10 percent slopes (MeC).—Except that the subsurface layer is thinner, this soil has a profile similar to that described as representative of the series. Most areas are wooded. About 25 percent of the acreage is moderately eroded.

This soil is well suited to most local crops if effective measures are used for controlling erosion. Capability unit IIIe–4; woodland suitability group 3o10.

Matapeake soils, 5 to 10 percent slopes, severely eroded (MkC3).—The surface layer of these soils ranges from fine sandy loam to heavy silt loam and in many places is browner than that described in the representative profile. Much of the original surface layer has been washed away, and material formerly in the subsoil has been mixed with the remaining surface layer by plowing. Gullies cut the areas, but most of these are shallow. Most areas are on short slopes in square fields that have not been adequately protected from erosion.

Because of the hazard of further erosion, these soils are better suited to hay, sodded orchards, and woodland than to clean-tilled crops. If all suitable practices are used to provide protection from erosion, clean-tilled crops can be grown about 1 year in 5. Capability unit IVe–3; woodland suitability group 3o10.

Matapeake soils, 10 to 15 percent slopes (MkD).—In these soils the surface layer is fine sandy loam, loam, or silt loam. Included in mapping are a few small areas where the subsoil is lighter textured and less sticky than that in the representative profile.

Moderately steep slopes make use of these soils for crops marginal. Only a few acres have been affected by erosion, however, because most areas have never been cleared and cultivated. These soils are suitable for cultivation only if adequate protection from erosion is provided. Capability unit IVe–3; woodland suitability group 3o10.

Matapeake soils, 15 to 30 percent slopes (MkE).—In these soils the surface layer is fine sandy loam or silt loam. The surface layer and the subsoil are somewhat thinner than those in the profile described as representative of the series. In places the soils are somewhat eroded. These soils are suited to pasture, woodland, lawns, and wildlife. Capability unit VIe–2; woodland suitability group 3r10.

Mattapex Series

The Mattapex series consists of level to gently sloping, moderately well drained soils on uplands. These soils formed in a mantle of silt and fine sand that is 3 to 4 feet thick and is underlain by coarser textured material. The subsoil of these soils is heavy loam to silty clay loam, and it is mottled in the lower part. Areas of Mattapex soils generally are 20 or more acres in size and are between areas of Matapeake soils and large areas of the gray Othello soils. Scattered small areas of Mattapex soils also occur in shallow depressions within large areas of Matapeake soils, and on very slightly elevated areas within areas of Othello soils. About 25 percent of the Mattapex soils in Worcester County are covered by mixed hardwoods, loblolly pines, and a dense understory of shrubs.

In a representative profile the surface layer is about 9 inches of dark grayish-brown loam. The subsoil, about 37 inches thick, is yellowish-brown slightly sticky, heavy loam in the upper 7 inches; yellowish-brown and pale-olive firm, sticky silty clay loam that has mottles in the lower part in the next 23 inches; and light olive-gray, firm, sticky, mottled sandy clay loam in the lower 7 inches. At a depth of about 46 inches is light olive-gray crumbly light sandy loam that has brown mottles and streaks.

Available moisture capacity is high in Mattapex soils, and natural fertility is moderate. Permeability is moderately slow. These soils are strongly acid in the part of the subsoil that has the finest texture.

On these soils the main concern of management is wetness. The mottling in the lower part of the subsoil indicates that the subsoil is saturated for long periods in wet seasons. As a result preparing a seedbed and planting are delayed, and the choice of a crop is likely to be affected. Corn and soybeans are the main crops, except near Snow Hill where tomatoes and peas are grown. These soils have moderate limitations for use as homesites and severe limitations for disposal of effluent from septic tanks.

Representative profile of Mattapex loam, 0 to 2 percent slopes, in a level cultivated area about 1½ miles northwest of Snow Hill and 250 feet west of Route 354:

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) loam; weak, fine and medium, granular structure; friable, slightly sticky and slightly plastic; many roots; slightly acid (limed); abrupt, smooth boundary.

B1—9 to 16 inches, yellowish-brown (10YR 5/4) heavy loam; weak, medium, granular and weak, fine, subangular blocky structure; friable to slightly firm, slightly sticky and slightly plastic; common roots; dark grayish-brown (10YR 4/2) silt loam in old root channels; slightly acid; clear, smooth boundary.

B21t—16 to 29 inches, yellowish-brown (10YR 5/6) light silty clay loam; faint, pale-yellow (2.5Y 7/4) mottles in lower part; weak, medium, blocky structure; firm, sticky and plastic; a few roots; thin discontinuous clay films; medium acid; clear, wavy boundary.

B22t—29 to 39 inches, pale-olive (5Y 6/3) silty clay loam; many, coarse, faint, light-gray (2.5Y 7/2) mottles and and a few, medium, prominent, strong-brown (7.5YR 5/8) mottles; weak, fine, subangular blocky structure; firm, sticky and plastic; a few roots; thin discontinuous clay films; strongly acid; clear, wavy boundary.

IIB3g—39 to 46 inches, light olive-gray (5Y 6/2) light sandy clay loam; common, coarse, distinct, yellowish-brown (10YR 5/6) mottles and a few, medium, prominent, strong-brown (7.5YR 5/6) mottles; weak, medium and coarse, blocky structure; friable, slightly sticky and plastic; a few roots; strongly acid; abrupt, smooth boundary.

IIC—46 to 55 inches, light olive-gray (5Y 6/2) light sandy loam; many, coarse, distinct, strong-brown (7.5YR 5/8) mottles; single grain to very weak, fine, granular structure; very friable, slightly sticky and slightly plastic; strongly acid.

The A horizon is silt loam, loam, or fine sandy loam. Its structure generally is granular, but in places it is subangular blocky. In wooded areas, or in other undisturbed areas, the A1 horizon is about 1 to 3 inches thick and the A2 horizon is somewhat thicker. The B horizon generally has weak or moderate, blocky or subangular blocky structure, but in places the B22t horizon has weak, platy structure. The B2t horizon is heavy silt loam to silty clay loam and generally is sticky and plastic. The B horizon is strongly acid to very strongly acid, except in areas that have been limed. The IIC horizon ranges from sandy loam to sand but generally is light sandy loam to loamy sand. In places near Indiantown these soils are underlain by gravel. The solum ranges from 30 to 40 inches in thickness, excluding the B3 horizon, which is lacking in many areas.

In the horizons above the mottled zone, hue is 10YR or 2.5Y and generally is 2.5Y within this zone, but in places hue in the mottled zone is 5Y. Hues generally are less red as depth increases. In the A1 and Ap horizons, value generally is 3 or 4, and chroma generally is 2 but ranges from 1 to 3. The value in the A2 horizon, where present, is about 5, and chroma is about 4. In the B horizon value is 5 or 6, and chroma generally is 3 to 6, but in a few places it is 8. Chroma is always less than 6 in some part of the B horizon. Depth to gray mottles that have a chroma of 2 or 3 is about 20 to 30 inches. The IIC horizon is one or more of a number of colors, but it is dominantly gray.

Mattapex soils are similar to Woodstown soils in drainage, but they have more silt and less sand throughout the solum than Woodstown soils. Mattapex soils formed in the same kind of silty material as the well-drained Matapeake soils, the poorly drained Othello soils, and the very poorly drained Portsmouth soils.

Mattapex fine sandy loam, 0 to 2 percent slopes (MoA).—This soil has a profile similar to that described as representative of the series, but its surface layer contains less silt and more fine sand.

The chief concern of management is the moderately slow permeability, which causes the surface of this soil to be somewhat cold and wet in spring. Consequently, planting dates generally are later than for soils of the Matapeake series. Excess surface water can be removed effectively by ditches or by tile. Erosion generally is not a hazard.

If this soil is adequately drained, it is well suited to most crops commonly grown in the county. Capability unit IIw-5; woodland suitability group 3o13.

Mattapex fine sandy loam, 2 to 5 percent slopes (MoB).—This sloping soil has a profile similar to that described for the series, but its surface layer contains less silt and more fine sand. It is subject to erosion, and about 32 percent of the acreage is moderately eroded.

Included with this soil in mapping are a few acres near streams where slopes are more than 5 percent.

Figure 10.—**Baskets of tomatoes in a field near Snow Hill. The soil is Mattapex silt loam, 0 to 2 percent slopes.**

Further erosion is a hazard on this Mattapex soil because the intake of rainwater is fairly slow and runoff generally is excessive. If excess water is carefully removed and erosion is controlled, this soil is suited to most crops. Capability unit IIe-36; woodland suitability group 3o13.

Mattapex loam, 0 to 2 percent slopes (MpA).—This soil has the profile described as representative of the series. Drainage is the chief concern of management. This soil is easier to drain, however, than Mattapex silt loam, 0 to 2 percent slopes, and it can be worked sooner in spring. On the other hand, it is harder to work than Mattapex fine sandy loam, 0 to 2 percent slopes, and it must be worked later in spring. Capability unit IIw-1; woodland suitability group 3o13.

Mattapex loam, 2 to 5 percent slopes (MpB).—This soil has a profile similar to that described as representative of the series, but slopes are stronger. It is subject to erosion, and about 27 percent of the acreage is moderately eroded. In places plowing to normal depth turns up part of the yellowish-brown subsoil, which gives the fields a spotty appearance.

Included with this soil in mapping are some small areas where slopes are a little more than 5 percent.

This Mattapex soil is slower to warm in spring and is somewhat more difficult to plow, cultivate, and drain than Mattapex fine sandy loam, 2 to 5 percent slopes. Capability unit IIe-16; woodland suitability group 3o13.

Mattapex silt loam, 0 to 2 percent slopes (MtA).—The surface layer of this soil contains less sand and more silt than that in the profile described as representative of the series. The subsoil generally is light silty clay loam, but in places it is heavy silt loam. Included in mapping are small areas where the subsoil is sticky silty clay.

This soil can be used and managed about the same as Mattapex loam, 0 to 2 percent slopes. Removing excess water from the surface in spring and in other wet periods is necessary for good growth of crops. Under good management that includes a suitable cropping system and adequate amounts of fertilizer and lime, this soil is well suited to most crops grown in the county (fig. 10). Capability unit IIw-1; woodland suitability group 3o13.

Mattapex silt loam, 2 to 5 percent slopes (MtB).—The profile of this soil is similar to that described as representative of the series except that the surface layer contains less sand and more silt. Included in mapping are a few areas where slopes are more than 5 percent.

Erosion is the chief concern of management on this Mattapex soil, and about 30 percent of the acreage is moderately eroded. Including grasses in the cropping system, following clean-tilled crops with winter cover crops, and cultivating on the contour are among the practices that can be used to protect this soil from erosion. In addition, a drainage system must be provided and maintained. Capability unit IIe-16; woodland suitability group 3o13.

Mixed Alluvial Land

Mixed alluvial land (My) occupies level and nearly level bottom land along many streams of this county. The areas are small and narrow and in places are flooded several times a year, but in others they are flooded only once in several years. The soil material consists of acid sand, silt, and clay that are well mixed. It washed from adjacent areas above or next to streams or ditchbanks. The material

lacks distinct or uniform characteristics. In many places where much organic matter has accumulated, the upper layers are black or dark gray. Within short distances the surface layer ranges from loamy sand to loam or silt loam, and in places in pockets the surface is mucky. Drainage generally is very poor, and ground water is close to the surface. Some areas, however, are better drained than others. In places changes in the course of streams cause erosion of streambanks.

The native vegetation varies according to the texture of the soil material and the degree of wetness. Red maple, oaks, and gums are the most common trees. Pawpaw and baldcypress grow in the wetter areas, and loblolly pine grows in places that are not so wet.

Because this land type is variable and generally is wet and subject to flooding, little of it is farmed. Areas of this land type that are adequately drained can be used for pasture or forage crops. Capability unit VIw–1; woodland suitability group 2w7.

Muck

Muck (Mz) consists of level and nearly level, very poorly drained, black soils that are extremely acid. It is generally next to sand bluffs of Lakeland soils along major rivers of the county and in some areas is ponded. These soils formed in highly organic remains of plant material, mostly leaves of hardwood trees. This material overlies and is partly mixed with extremely acid mineral sediment that generally is sand. The native trees were Atlantic white cedar and baldcypress. Today, however, the trees are mostly red maple, sweetgum, blackgum, and a few scattered cypress in areas inaccessible by road.

A typical area of Muck is in a heavily wooded area next to the Pocomoke River southwest of Masseys Crossing and about 2½ miles south-southwest of Whaleysville. It consists of 2 inches of leaves, twigs, and roots over 16 inches of black crumbly muck. The next layer is about 15 inches of black crumbly muck that contains pockets of partly decomposed plant material. Below is 5 inches of dark-gray, somewhat crumbly, mucky peat that contains a few thin bands of fine sand and many old partly decomposed roots. Underlying this material is several feet of gray to light olive-gray, mottled, loose sand that contains a few lenses of muck.

The surface layer is black or very dark brown. It feels gritty in places because of sand that was deposited by floodwater. Muck varies considerably in depth because it formed in old ponds and stream channels and in fairly broad shallow valleys that became filled with organic material. It ranges from 3 to 19 feet in thickness, but it generally is 3 to 6 feet thick. The material underlying Muck is sand, loamy sand, or sandy loam.

Muck is slow to warm in spring and becomes wet in fall before other soils in the county. The soil subsides and shrinks when dry. Muck burns when dry, and severely burned areas have an uneven surface of low mounds and shallow depressions. When wet, Muck leaves stains on the hands that are difficult to wash off.

If Muck is drained and the water level is carefully controlled to prevent subsidence, it is suited to a number of special crops, including blueberries and certain vegetable or truck crops. Only a few acres of these soils are farmed, however, and about 95 percent of the total acreage is in wetland hardwood. Muck is not suitable for building sites. In many places, however, it provides good sites for excavated ponds and excellent habitat for certain kinds of wildlife. Capability unit IVw–7; woodland suitability group not assigned.

Othello Series

The Othello series is made up of level and nearly level, poorly drained, dominantly gray soils. The soils are in large flat areas, some of which are more than 1,000 acres in size. They formed in 24 to 34 inches of highly silty material underlain by sandy material. The gray surface and the numerous ditches are the most outstanding features of these soils in cultivated areas. The native vegetation consists chiefly of water-tolerant hardwoods. In heavily cutover fields and reforested areas, loblolly pine grows in almost pure stands.

In a representative profile a mat of pine needles overlies about 5 inches of dark-gray silt loam. The subsurface layer is about 4 inches of gray or light-gray silt loam. The upper 16 inches of the subsoil is gray firm light silty clay loam that is sticky when wet. The lower 6 inches is gray firm sandy clay loam. The subsoil has yellowish-brown streaks and mottles in the upper and lower parts. The substratum, which is at a depth of about 31 inches, is gray or light-gray loose loamy sand.

About 25 percent of the acreage of Othello soils is farmed, but most of the acreage formerly was cultivated. Many fields once used for crops have reverted to trees. Such fields were originally drained by ditches, but the ditches were not maintained. The fields then became flooded and could no longer be used for crops.

Unless the Othello soils are artificially drained, they are likely to be covered by water late in winter and early in spring. Open ditches are most commonly used for improving drainage. Tile is not very effective because water moves moderately slowly through the subsoil. The ditchbanks are fairly stable, but ditches more than 3 feet deep cave in because of the loamy sand substratum. The Othello soils are extremely acid unless they have been limed, but they have high available moisture capacity and moderate natural fertility. Where drainage is improved and adequate amounts of lime and fertilizer are applied, these soils are suited to corn and soybeans. A few acres near Snow Hill and Berlin, however, are used to grow tomatoes. Good sites for excavated ponds are on these soils (fig. 11). Othello soils have severe limitations for use as building sites and for disposal of effluent from septic tanks.

Representative profile of Othello silt loam, in a nearly level wooded area in Pocomoke State Forest, about a mile southeast of Corbin:

O1—2 to 1 inches, litter of leaves, mostly loblolly pine needles.

O2—1 to 0 inches, mat of decomposed organic material.

A1—0 to 5 inches, dark-gray (5Y 4/1) silt loam; weak, medium, granular structure; friable, slightly sticky and slightly plastic; many roots; strongly acid; clear, smooth boundary.

A2g—5 to 9 inches, gray or light-gray (5Y 6/1) silt loam; very weak, fine, granular structure; friable, sticky and slightly plastic; common roots; dark-gray (5Y 4/1) silt loam in old root channels; very strongly acid; clear, irregular boundary.

B2tg—9 to 25 inches, gray (N 5/0) light silty clay loam; common, medium, distinct mottles of yellowish brown (10YR 5/8); weak, medium, blocky and subangular

Figure 11.—**Farm pond in Othello silt loam used as a source of water for firefighting.**

blocky structure; firm, sticky and plastic; a few roots; a few light olive-gray (5Y 6/2) clay films; extremely acid; gradual, wavy boundary.

IIB3g—25 to 31 inches, gray (N 5/0) sandy clay loam; a few, medium, distinct mottles of yellowish brown (10YR 5/6); very weak, medium, platy structure; firm, sticky and plastic; a few roots; extremely acid; abrupt, smooth boundary.

IICg—31 to 42 inches, gray or light-gray (N 6/0) loamy sand; single grain; loose; a few woody roots; extremely acid.

The B2tg horizon ranges from heavy silt loam to silty clay loam. The B3 horizon, if present, is sandy clay loam or clay loam. The IICg horizon ranges from sand to light sandy loam, and in many places it is stratified. The solum is 24 to 36 inches thick.

Structure ranges from very weak to moderate in these soils. The B2tg horizon commonly has blocky structure, but the structure ranges to platy or subangular blocky.

In cultivated areas the Ap horizon is light-gray and consists of the dark-gray A1 horizon and all or part of the gray or light-gray A2g horizon. Value in the A1 and Ap horizons generally is 4 to 5, and chroma is 0, 1, or 2. In the A2g horizon value is 1 or 2 units higher than it is in the A1 or Ap horizons, and chroma is about the same. Value in the B horizon and in the IIC horizon, if it is present, is 5 to 7, and chroma is 0 or 1, but in a few places it is 2. The IIC horizon varies in color but is dominantly gray. Throughout the profile hue ranges from 10YR to 5Y. Hues of 10YR, if present, are in the upper part of the profile. Mottles generally do not occur above the upper part of the B horizon, but in some areas they are in the A2g horizon. Hue of most mottles is 10YR or 7.5YR, value is 5 or 6, and chroma ranges from 1 to 8 but generally is 6. Values for dry soil material generally are one unit higher than those given here.

Othello soils formed in the same or nearly the same kind of materials as the well drained Matapeake soils, the moderately well drained Mattapex soils, and the very poorly drained Portsmouth soils. In many places they are closely associated with Fallsington soils. Othello soils are similar to Fallsington and Elkton soils in drainage, color, and reaction. They have a more silty and less sandy solum than that of Fallsington soils and are less permeable than those soils. Othello soils have a less clayey B horizon than Elkton soils and therefore are more permeable than those soils.

Othello silt loam (Ot).—This is the only Othello soil mapped in the county. It is level and nearly level. Included in mapping, however, are a few gently sloping areas where erosion is a slight hazard in places. Also included are areas that are nearly at sea level and are occasionally flooded during unusually high tides. Because of the low elevation, soil in these areas tends to remain wet longer than is normal for soils of this series. In places these low areas have been seriously affected by salt water.

This soil retains and supplies nutrients well, and it responds well to good management. It is late to warm in spring, however, and planting dates generally are delayed. In places in dry cultivated fields, the surface of this soil appears to be white. For this reason the soil is called "white pipe clay" or "white oak soil." Capability unit IIIw–7; woodland suitability group 3w13.

Plummer Series

The Plummer series consists of level or nearly level, deep, sandy soils that are poorly drained and very poorly drained. These soils formed in old deposits of sandy material. The material has changed little, except for darkening of the surface in places by organic matter and mottling of the underlying sand in places because of lack of air when the soil is wet for long periods. Areas of these soils range from 5 to 100 acres in size. They are in slight depressions and in nearly level uplands. The native trees in wooded areas are wetland hardwoods and conifers, including red maple, gums, holly, loblolly pine, and pond pine. In areas that are rewooded or heavily cut over, loblolly pine grows in nearly pure stands.

In a representative profile the surface layer is grayish-brown loose loamy sand to a depth of about 7 inches, and then light brownish-gray loose loamy sand to a depth between 7 and 10 inches. Below, to a depth between about 10 and 48 inches, is light olive-gray loose loamy sand that is mottled and streaked with brown and is underlain by light-gray loose coarse sand.

Except in drained areas, Plummer soils have a high water table most of the year. Available moisture capacity is very low. Permeability is rapid, and water, air, and roots penetrate the soil material easily. The soils can be worked throughout a wide range of moisture content if the water table is properly controlled. Plummer soils are naturally very strongly acid and low in plant nutrients and content of organic matter. They must be carefully limed and fertilized for crops to grow well. Soil blowing is a hazard in cultivated areas.

Adequate drainage is needed if these soils are farmed. Tile lines or ditches can be used, but ditchbanks tend to cave in during wet seasons unless they are stabilized. Drained areas of these soils are likely to be droughty in dry years, and supplemental irrigation is needed if crops of high value are grown.

About 33 percent of the acreage of these soils is farmed. A larger acreage formerly was farmed, but many fields once used for crops now have a cover of loblolly pine. Corn and soybeans are main crops, but melons and cucumbers are grown on a few farms. Good sites for excavated ponds generally are on these soil. The high water table severely limits use of these soils for building sites and for disposal of effluent from septic tanks.

Representative profile of Plummer loamy sand in a level wooded area on County Line Road about 2 miles south of the intersection of Somerset, Wicomico, and Worcester Counties:

A11—0 to 7 inches, grayish-brown (2.5Y 5/2) loamy sand; many white sand grains; single grain; loose; many roots; very strongly acid; gradual, wavy boundary.

A12—7 to 10 inches. light brownish-gray (2.5Y 6/2) loamy sand; single grain; loose; a few roots; very strongly acid; clear, irregular boundary.

C1g—10 to 48 inches, light olive-gray (5Y 6/2) loamy sand; a few, medium and coarse, distinct mottles of brown (10YR 5/3); single grain; loose; a few roots; in places includes material like that in A12 horizon; few, small, irregularly shaped spots of slightly sticky sandy loam; very strongly acid; abrupt, smooth boundary.

IIC2g—48 to 54 inches, light-gray (5Y 7/1) coarse sand; single grain; loose; no roots; very strongly acid to extremely acid.

The C1g horizon is loamy sand, sand, or fine sand. Nonconforming horizons of sandy loam to sandy clay loam generally are at a depth of 6 feet or more.

In cultivated areas the Ap horizon is grayish brown when moist. This horizon is gray to almost white when dry, particularly where exposed to the weather for a long time, because the organic material has been washed off the sand grains. Throughout the profile hue centers on 2.5Y but ranges from 10YR to 5Y. In the A horizon value generally ranges from 4 to 6, and chroma is 0, 1, or 2. Where the A11 horizon is less than 8 inches thick, however, value may be only 2 or 3. In the C horizon value generally is 6 or 7 but ranges from 5 to 8, and chroma is 0, 1, or 2. In many areas the C horizon is uniformly gray, light gray, or white, but in other areas it has variegations of these colors, and in places it is streaked or stratified.

Plummer soils are not so well drained as Lakeland and Klej soils, but they occur in the same areas as these soils. They formed in the same kind of material as Lakeland, Leon, Rutlege, and St. Johns soils. They are a little better drained than Rutlege soils, and they lack the black surface layer characteristic of those soils. Also, Plummer soils lack the cemented Bh horizon characteristic of Leon and St. Johns soils.

Plummer loamy sand (Pe).—This is the only Plummer soil mapped in the county. In most places this soil is level or nearly level, but in small areas slopes are slightly more than 2 percent.

This wet soil is slow to warm in spring, and it retains few plant nutrients from year to year. If it is drained, it is suited to cultivated crops. Capability unit IVw–6; woodland suitability group 2w7.

Pocomoke Series

In this series are level and nearly level, very poorly drained soils in depressions and on broad upland flats. These soils formed in old deposits of very strongly acid sandy material that contains considerable amounts of silt and clay. The surface layer characteristically is dark colored because it contains large amounts of organic matter. The native trees are wetland hardwoods, pond pine, and loblolly pine. In some places Pocomoke soils are covered with water much of the year, but other areas have a dense cover in shrubs, briers, and pawpaw trees. Some areas are in natural stands of wild blueberries. In cultivated fields these soils appear as black areas crossed by many ditches.

In a representative profile a partly decayed layer of pine needles overlies about 20 inches of black and dark-gray sandy loam. The subsoil, which is about 14 inches thick, is gray, somewhat sticky, mottled sandy clay loam in the upper part and gray, sticky sandy clay loam in the lower part. The upper part of the substratum is light-gray sandy loam that has streaks and mottles of yellowish brown, and the lower part is light-gray, loose sand to a considerable depth.

Pocomoke soils are slow to warm in spring, and planting dates may be delayed. Available moisture capacity is high, and natural fertility is moderate. Permeability is moderate to a depth of 25 inches or more in most areas, which permits the use of tile or open ditches for disposal of excess water. Unless they have been limed, these soils are very strongly acid to a depth of 40 inches. When drained, Pocomoke soils are easy to work and they respond to fertilizer and lime.

About 33 percent of the acreage of Pocomoke soils in the county is cultivated. The rest is woodland that is good wildlife habitat. If these soils are drained, they are suited to most crops grown in the county. Undrained areas are used as woodland. Many fields that formerly were cultivated now have good stands of loblolly pines on them. Good sites for excavated ponds generally are on these soils. The high water table severely limits use of these soils for building sites and for disposal of effluent from septic tanks.

Profile of the Pocomoke sandy loam in a level wooded area on the east side of Brick Kiln Road extended, about 3 miles southeast of Snow Hill:

O1—3 to 1 inches, forest litter from pine that is partly decayed.

O2—1 to 0 inches, mat of decomposed organic material that contains many fine roots.

A11—0 to 14 inches, black (10YR 2/1) sandy loam; weak, fine, granular structure; friable, slightly sticky and slightly plastic; many roots; very strongly acid; clear, smooth boundary.

A12—14 to 20 inches, dark-gray (10YR 4/1) sandy loam; weak, fine, granular structure; friable, slightly sticky and slightly plastic; a few roots; dark organic stains and streaks in places; very strongly acid; clear, smooth boundary.

B21tg—20 to 29 inches, gray (5Y 5/1) heavy sandy clay loam; common, medium, prominent mottles of yellowish brown (10YR 5/6); weak, fine, subangular blocky structure; firm, slightly sticky and plastic; a few roots; thin dark-colored clay films; very strongly acid; gradual, wavy boundary.

B22tg—29 to 34 inches, gray (5Y 5/1) light sandy clay loam; moderate, fine, subangular blocky structure; firm, sticky and very plastic; a few roots; thin dark-colored clay films; very strongly acid; abrupt, wavy boundary.

C1g—34 to 40 inches, gray or light-gray (10YR 6/1) light sandy loam; common, medium, distinct mottles of yellowish brown (10YR 5/8) and a few, medium, distinct mottles of olive yellow (2.5Y 6/6); compact; massive to very weak, fine, subangular blocky structure; very friable, slightly sticky and slightly plastic; very strongly acid; abrupt, wavy boundary.

IIC2g—40 to 53 inches, light-gray (5Y 7/1) sand; structureless, single grain; loose; no roots; strongly acid.

The A horizon is loam or sandy loam, and in places in ponded areas in undisturbed woodland an organic horizon occurs just above it. The Bt horizon is heavy sandy loam or sandy clay loam. Structure throughout the profile is mostly weak or moderate, but in the B horizon it is strong in places and is blocky, subangular blocky, or both. The finer-textured horizons generally are sticky and plastic. In places they are very plastic. The solum ranges from about 25 to 40 inches in thickness. In places there is no C1g horizon, but a definite IIC horizon generally is present, and its texture varies abruptly within the horizon. In places the sandy substratum contains pockets or lumps of light sandy clay loam.

The A11 horizon generally is black. In this horizon hue ranges from 10YR to 5Y, value is 2, and chroma is 0 or 1. In plowed areas, value in the Ap horizon is 2 or 3 and chroma is 0 or 2. Value in the A12 horizon is two or three units higher than it is in the A11 horizon. Below the A horizon the matrix is 10YR to 5Y in hue. It generally is 5 or 6 in value, or in places is 4, and generally is 0 or 1 in chroma, or in places is 2. Mottles in the B horizon generally are prominent. They generally have a value of 5 and a chroma of 6 to 8, but in places they are grayish and have low chroma. In some areas the profile or a particular horizon is gray or has variegations of gray, and few if any

mottles are present. Values for dry soil generally are one unit higher than those given here, which are for moist soil.

Pocomoke soils generally are associated with Fallsington soils, but in many places they are near sandy soils. They occupy lower positions than any of these soils. Pocomoke soils resemble Portsmouth, Rutlege, and St. Johns soils in drainage. They have less sand and more silt and clay throughout the profile than Rutlege or St. Johns soils. Their subsoil contains more sand and less silt than that of Portsmouth soils.

Pocomoke sandy loam (Pk).—This level and nearly level soil has the profile described as representative of the series. Included in mapping are a few acres where the slope is slightly more than 2 percent.

Because this soil is somewhat more sandy than Pocomoke loam, it warms up more quickly, is easier to work, and is somewhat easier to drain. Also, tile drains and ditches can be spaced further apart. Tile lines function well in this soil if they are properly installed and have an adequate outlet. Drained areas can be cultivated and are well suited to corn and soybeans. Most undrained areas are used as woodland, which includes good stands of loblolly pine. Capability unit IIIw–6; woodland suitability group 2w7.

Pocomoke loam (Pm).—The surface layer of this soil contains more silt and less sand than that in the profile described as representative of the series. Also, the subsoil generally contains a little more silt and clay and is somewhat stickier and heavier.

This soil warms more slowly in spring than Pocomoke sandy loam, and it generally cannot be cultivated so soon. The high water table retards internal drainage. Erosion generally is a slight hazard. Capability unit IIIw–7; woodland suitability group 2w7.

Portsmouth Series

The Portsmouth series consists of level and nearly level, very poorly drained soils on upland flats and in depressions. These soils formed in 2 or 3 feet of silty material underlain by coarse-textured material. The native vegetation is trees that tolerate wetness, mostly hardwoods, but pond and loblolly pines are common in heavily cutover fields and reforested fields. Where these soils are cultivated, they appear as black areas crossed by many ditches.

In a representative profile about 8 inches of very dark brown silt loam overlies about 4 inches of black crumbly silt loam. The subsoil is dark-gray crumbly heavy silt loam in the upper 6 inches; gray sticky silty clay loam that has bright yellowish-brown mottles in the next 11 inches; and gray or light-gray, slightly sticky, mottled heavy silt loam in the lower 6 inches. The substratum is gray or light-gray friable sandy loam in the upper 14 inches and light-gray loose sand below.

Portsmouth soils are wet most of the year and may be ponded late in winter and early in spring. These soils generally are difficult to drain, but adequate drainage must be provided for all kinds of crops. Open ditches are more suitable than tile lines, which commonly do not function properly. These soils warm slowly in spring, but they have a good supply of organic matter and have high available moisture capacity. They are strongly acid to extremely acid and are moderately fertile.

About one-third of the acreage of these soils is farmed, and the rest is wooded. Portsmouth soils are well suited to corn and soybeans. They also are suited to trees and to use as wildlife habitat. The high water table and moderately slow permeability severely limit use for building sites and for disposal of effluent from septic tanks.

Representative profile of Portsmouth silt loam in a soybean field on Evans Road, 1½ miles southwest of Berlin:

Ap—0 to 8 inches, very dark brown (10YR 2/2) silt loam; weak, fine, granular structure; friable, slightly plastic and slightly sticky; many roots; strongly acid; abrupt, smooth boundary.

A1—8 to 12 inches, black (10YR 2/1) silt loam; weak, fine to medium, subangular blocky structure and fine granular; friable, slightly plastic and slightly sticky; many fine roots; strongly acid; clear, wavy boundary.

B1—12 to 18 inches, dark-gray (5Y 4/1) heavy silt loam; weak, fine to medium, subangular blocky structure; friable, slightly plastic and sticky; a few fine roots; very strongly acid; clear, smooth boundary.

B21tg—18 to 29 inches, gray (5Y 5/1) silty clay loam; common, medium, distinct mottles of yellowish brown (10YR 5/8); moderate, very fine or fine, subangular blocky structure; firm, plastic and sticky; a few fine roots between peds; thin, continuous, dark-gray (10YR 4/1) clay films on peds; very strongly acid; clear, smooth boundary.

B22tg—29 to 35 inches, gray or light-gray (5Y 6/1) heavy silt loam; common, coarse, distinct mottles of yellowish brown (10YR 5/8) and common, medium, faint mottles of light gray (N 7/0); moderate, very fine to fine, subangular blocky structure; firm, plastic and slightly sticky; roots between peds; thin, discontinuous, dark-gray (10YR 4/1) clay films on peds; extremely acid; abrupt, smooth boundary.

IIC1g—35 to 49 inches, gray or light-gray (5Y 6/1) sandy loam; common, coarse, distinct mottles of yellowish brown (10YR 5/6); very weak, fine, subangular blocky structure; friable, slightly plastic and slightly sticky; a few roots; very strongly acid; abrupt, wavy boundary.

IIIC2—49 to 80 inches, light-gray (5Y 7/1) sand that has a few dark-gray (5Y 4/1) streaks; single grain; loose; strongly acid.

The A horizon is sandy loam or silt loam and has granular structure. In wooded areas an organic layer commonly covers the A horizon. The Bt horizon ranges in texture from silt loam to silty clay loam. Structure in this horizon generally is blocky, subangular blocky, or both, but in places it is prismatic. Consistence in the Bt horizon is slightly sticky. If a C horizon is present, it is always coarser textured than the Bt horizon. The IIC horizon is of any unconforming texture, but in many places it is sandy instead of loamy. The solum ranges from 27 to 38 inches in thickness.

In places the A horizon is neutral in color. Chroma in the A1 horizon commonly is 1, but in a few places it is 0. In the Ap horizon value normally is 2 or 3 and seldom is 4, and chroma is 0, 1, or 2. Value increases in this horizon after the soil has been cultivated for several years. Hue in the B horizon generally is 5Y but in places is 2.5Y. In the Bt horizon value of the matrix is 3 to 6, and chroma is 2 or less. The IICg horizon is gleyed, and it varies in color. Where mottling is present hue ranges from 5Y to 7.5YR, value from 4 to 7, and chroma from 2 to 8. Values for dry soil generally are one unit higher than those given here, which are for moist soil.

Portsmouth soils occur within areas of Othello soils in lower positions and in small pockets. They formed in the same or nearly the same kind of material as the well-drained Matapeake soils, the moderately well drained Mattapex soils, and the poorly drained Othello soils. Their surface layer is darker than that in Othello soils. Portsmouth soils contain more silt and clay throughout than Rutlege and St. Johns soils. They are similar to Pocomoke soils in wetness, color, and mottling, but their B horizon contains more silt and less sand.

Portsmouth sandy loam (Pr).—The surface layer of this level or nearly level soil contains more sand, less silt, and somewhat less clay than that in the profile described as representative of the series. Also, this soil is easier to work and drain than Portsmouth silt loam, though drain-

age is the main concern of management. Erosion is not a problem, except on about 16 acres of gently sloping soil that is scattered throughout the county. Two-thirds of the areas of this soil are cultivated, and the rest is used as woodland. Capability unit IIIw-6; woodland suitability group 2w7.

Portsmouth silt loam (Pt).—This soil has the profile described as representative of the series. The subsoil generally is silt loam and silty clay loam. Included in mapping are a few soils that have a subsoil of heavy silt loam and a few that have a subsoil of sticky silty clay.

This soil is more difficult to drain, work, and manage than Portsmouth sandy loam, and it warms later in spring. The very poor drainage limits use, and most areas are wooded. The soil is suited to corn and soybeans, however, if it is properly drained. Capability unit IIIw-7; woodland suitability group 2w7.

Rutlege Series

In the Rutlege series are level and nearly level, very poorly drained soils in depressions and on upland flats. Some areas of these soils are larger than 50 acres. The native trees are red maple, gums, water-tolerant oaks, loblolly pine, and pond pine. The understory commonly is holly, pawpaw, and greenbrier, but wild blueberries grow in some areas. Cultivated fields generally appear as dark areas crossed by many ditches.

In a representative profile a mat of partly decayed pine needles overlies about 12 inches of black loamy sand. Below is about 9 inches of dark-gray, very friable loamy sand underlain by about 30 inches of light-gray loose sand.

Rutlege soils are very strongly acid throughout unless they have been limed, and care is needed to avoid overliming. Most of the acreage is wooded, but small areas within large fields of other soils are cultivated. Excess water can be removed by ditching or tiling. These soils generally provide good sites for excavated farm ponds. The high water table severely limits use for building sites and for disposal of effluent from septic tanks.

Representative profile of Rutlege loamy sand in a level wooded area on the east side of Stevens Road, about one-tenth mile north of Richardson Road:

O1—4 to 2 inches, litter of pine needles and hardwood leaves.
O2—2 inches to 0, a mat of decomposed organic material that contains many fine roots.
A11—0 to 12 inches, black (10YR 2/1) loamy sand; weak, fine, granular structure; loose or very friable; many roots; very strongly acid; clear, irregular boundary.
A12g—12 to 21 inches, dark-gray (10YR 4/1) loamy sand; weak, fine, granular structure; very friable; a few roots; black material from A11 horizon in old root channels; very strongly acid; clear, wavy boundary.
Cg—21 to 51 inches, light-gray (10YR 7/1) sand or light loamy sand; single grain; loose; a few roots; very strongly acid; abrupt, smooth boundary.

In places the A horizon has weak granular structure, but all other horizons in these soils are structureless. These soils are neither sticky nor plastic.

In the A horizon hue ranges from 10YR to 5Y but centers on 2.5Y. In cultivated areas, the Ap horizon is black or very dark gray and the A12 horizon is dark gray or very dark gray. The matrix of the Cg horizon has a value of 5 to 7 and a chroma of 0, 1, or 2. If streaks or mottles are present in the Cg horizon, the value ranges from 5 to 8 and the chroma ranges from 2 to 6. Value generally is one unit higher in dry soil than the values given here for moist soil.

Rutlege soils are near the St. Johns and Plummer soils. They lack the cemented Bh horizon of the St. Johns soils, and their surface layer is darker than that in the Plummer soils. Rutlege soils formed in the same kind of sandy sediment as the excessively drained Lakeland soils, the moderately well drained Klej soils, and the poorly drained to very poorly drained Plummer soils.

Rutlege loamy sand (Ru).—This level and nearly level soil is the only Rutlege soil mapped in the county. Its use is limited by very poor drainage, very strong acidity, and sandiness. This soil also is slow to warm in spring. After this soil is drained, limed, and fertilized, it is suited to corn, truck crops, and soybeans. This soil is also suited to blueberries, but areas used for blueberries should not be limed. If the growing season is dry, plants cannot obtain sufficient moisture in areas that have been drained, and crops in such areas benefit from irrigation. Excessive leaching of fertilizer can be avoided by applying the fertilizer in small amounts at intervals during the growing season. Capability unit IVw-6; woodland suitability group 3w13.

Sassafras Series

The Sassafras series consists of level to steep, deep, well-drained soils that generally are on uplands and next to rivers. These soils formed in marine deposits or in old alluvium made up of loamy and sandy material. Where the soils are wooded, the native trees are mostly oaks and other hardwoods, but loblolly pine grows in nearly pure stands in many cutover and second-growth areas. Cultivated fields of Sassafras soils appear as very dark grayish-brown areas unbroken by drainage ditches. In places areas of Sassafras soils are more than 100 acres in size and contain small depressions occupied by Woodstown soils.

In a representative profile a mat of partly decayed leaves and twigs overlies an inch of very dark grayish-brown sandy loam. Below is about 7 inches of olive-brown sandy loam. The subsoil is about 25 inches thick. It is light yellowish-brown crumbly heavy sandy loam in the upper 5 inches and light yellowish-brown crumbly and slightly sticky light sandy clay loam in the next 8 inches. The remaining 12 inches is strong-brown, sticky sandy clay loam. Just below is yellowish-brown, friable loamy sand.

Sassafras soils are easy to till. Permeability is moderate, and available moisture capacity is moderate to high.

These soils are well suited to all crops commonly grown in the county, but in places slope and erosion limit use. Most level to sloping areas are farmed.

Representative profile of Sassafras sandy loam, 0 to 2 percent slopes, in a wooded area on the west side of Castle Hill Road, about 1 mile west of Scarboro:

O1—4 inches to 1 inch, loose litter of needles and twigs, and in places leaves from hardwood trees.
O2—1 inch to 0, mat of decomposed needles and leaves; many fine roots.
A1—0 to 1 inch, very dark grayish-brown (10YR 3/2) sandy loam; moderate, medium, granular structure; friable, slightly sticky and slightly plastic; many roots; medium acid; abrupt, irregular boundary.
A2—1 to 8 inches, olive-brown (2.5Y 4/4) to grayish-brown (10YR 5/2) sandy loam; weak, fine, granular structure; friable, slightly sticky and nonplastic; many roots; medium acid; clear, wavy boundary.
B1—8 to 13 inches, light yellowish-brown (10YR 6/4) heavy sandy loam; weak, medium, blocky and subangular blocky structure; friable, slightly sticky and slightly

plastic; common roots; medium acid or strongly acid; gradual, wavy boundary.

B21t—13 to 21 inches, light yellowish-brown (10YR 6/4) light sandy clay loam; moderate, medium, blocky and subangular blocky structure; friable, slightly sticky and slightly plastic; a few roots; thin, discontinuous, brown (10YR 5/3) clay films; medium acid or strongly acid; diffuse boundary.

B22t—21 to 33 inches, strong-brown (7.5YR 5/6) sandy clay loam; moderate, medium, blocky and subangular blocky structure; friable to firm, sticky and plastic; a few roots; a few, thin, almost continuous clay films; medium acid or strongly acid; clear, wavy boundary.

C—33 to 50 inches, yellowish-brown (10YR 5/8) loamy sand; single grain; slightly compact but friable; no roots; very strongly acid.

The A horizon is loam or sandy loam. It includes weak to moderate, blocky or subangular blocky structure, or both. The Bt horizon is sandy clay loam or heavy sandy loam, and between 18 and 25 percent of this horizon is clay. In places a transitional B3 horizon several inches thick is present. Structure in the B horizon is mostly moderate, blocky or subangular blocky, or both. The C horizon is loamy sand or sandy loam, but lenses of finer textured material are present. In places near Berlin a layer of gravelly material 2 to 3 feet thick is in the C horizon. The solum ranges from 30 to 40 inches in thickness.

In the A horizon hue is 10YR or 2.5Y. The value in the A1 horizon is 3 or 4. In the Ap horizon the value generally is 4 or 5, and the chroma is 2 to 4. In the B horizon the hue is 10YR or 7.5YR, value is 5 or 6, and chroma is 4 to 6. In a representative profile the chroma is 4 in some parts of the B horizon. In the C horizon, value is 5 or 6 and chroma ranges from 4 to 8. The B horizon is medium acid and strongly acid in areas that have been limed. In other areas reaction ranges from medium acid to extremely acid.

Sassafras soils are similar to Matapeake and Fort Mott soils in drainage. They contain less silt and more sand throughout than Matapeake soils. Their content of sand is less than that in Fort Mott soils, particularly in the surface layer. In many places areas of Fort Mott soils on small ridges interlace areas of Sassafras soils.

Sassafras soils are near the Woodstown and Fallsington soils, but they generally are at a slightly higher elevation.

Sassafras sandy loam, 0 to 2 percent slopes (SaA).—This soil has the profile described as representative of the series. Included in mapping, generally at the heads of waterways, are a few areas of moderately eroded soil in isolated areas.

Sassafras sandy loam, 0 to 2 percent slopes, is well suited to farming and locally is referred to as a "kind soil." It is easy to till, and it retains moisture well. Erosion generally is not a hazard. Growing cover crops in winter helps to maintain the content of organic matter. Capability unit I–5; woodland suitability group 3o10.

Sassafras sandy loam, 2 to 5 percent slopes, moderately eroded (SaB2).—Much of the original surface layer of this soil has been washed away, and material formerly in the subsoil has been mixed with the remaining surface layer by plowing. Slopes generally are long and smooth, and the soil is well suited to stripcropping. In places, however, sinkholes make the relief more complex.

Included with this soil in mapping are a few scattered areas of soils that are severely eroded or are not eroded.

The hazard of further erosion is the chief concern of management on this Sassafras soil. Disking crop residues into the soil and growing cover crops in winter helps to reduce soil blowing and water erosion. These practices also help to maintain tilth and to increase infiltration of water. Capability unit IIe–5; woodland suitability group 3o10.

Sassafras sandy loam, 5 to 10 percent slopes, moderately eroded (SaC2).—This soil generally has short, irregular slopes, and further erosion is a hazard. In wooded areas, however, little or no erosion has occurred. Erosion can be controlled in cultivated areas by using management practices that include intensive measures for control of erosion. In places irregular slopes hinder or prevent farming on the contour. Here field strips generally can be used effectively if all waterways are sodded and excess water is disposed of carefully. Many areas of this soil are small and are used the same as surrounding soils. Capability unit IIIe–5; woodland suitability group 3o10.

Sassafras sandy loam, 5 to 10 percent slopes, severely eroded (SaC3).—This soil has short irregular slopes. Most of the original surface layer has been removed by erosion, and in places the subsoil is exposed. A cover of close-growing plants should be kept on this soil most of the time. Capability unit IVe–5; woodland suitability group 3o10.

Sassafras sandy loam, 10 to 15 percent slopes (SaD).—Most of this soil is wooded or has a good cover of other plants. The soil therefore is not eroded, except in a few local areas. Included in mapping are a few soils that have mottles in places in the lower part of the subsoil.

If this Sassafras soil is cultivated, it deteriorates rapidly unless a protective cover is kept on the areas and other good management is applied. Capability unit IVe–5; woodland suitability group 3o10.

Sassafras sandy loam, 15 to 30 percent slopes (SaE).—In this soil the surface layer and subsoil are somewhat thinner than those described in the representative profile. Included in mapping are small areas of a soil that has a coarser textured surface layer than that in this soil.

Little of this soil has been cleared and cultivated, and except in a few scattered areas no erosion has occurred. This soil is suitable for pasture, woodland, and wildlife habitat. Capability unit VIe–2; woodland suitability group 3r10.

Sassafras loam, 0 to 2 percent slopes (SmA).—The surface layer of this soil contains more silt and clay and somewhat less sand than that in the profile described as representative of the series. Included in mapping are some soils that have a subsoil of heavy sandy clay loam.

This Sassafras soil retains plant nutrients well and provides plants with an adequate supply of moisture. Under good management, erosion is not a hazard. Capability unit I–4; woodland suitability group 3o10.

Sassafras loam, 2 to 5 percent slopes, moderately eroded (SmB2).—This soil has stronger slopes, but it otherwise is like Sassafras loam, 0 to 2 percent slopes. Included in mapping are small scattered areas where slopes are slightly more than 5 percent.

If this soil is well managed, it is suited to most crops commonly grown in the county. Capability unit IIe–4; woodland suitability group 3o10.

St. Johns Series

The St. Johns series consists of level and nearly level, very poorly drained, sandy soils that are in slight depressions on upland flats. These soils contain very little silt and clay. They have a thick black surface layer and a cemented sandy subsoil. Locally the cemented subsoil is called "Indian hearth" or "ironstone." The St. Johns soils formed in thick beds of very strongly acid or extremely

acid marine sand or loamy sand. They generally occur in small oblong areas 10 to 15 acres in size, but in places the areas are larger than 50 acres. The principal trees are red maple, wetland hardwoods, and some loblolly pine and pond pine. The undergrowth commonly is bay and greenbrier, but in places blueberries and teaberries grow naturally.

In a representative profile a mat of leaves and twigs overlies about 11 inches of black loamy sand. Below is about 6 inches of very dark gray loose loamy sand. The hardpan, beginning at a depth of about 17 inches, is very dusky red cemented loamy sand in the uppermost 3 inches; dark reddish-brown cemented extremely hard sand in the next 8 inches; and brown or dark-brown very weakly cemented sand in the lower 11 inches. The substratum is pale-brown to pale-olive loose sand to a depth of 68 inches and light olive-gray sticky sandy clay loam or sandy clay below.

Unless these soils are drained, they are saturated with water most of the year and are ponded at times. In places in drained areas, on the other hand, the hardpan limits the amount of moisture available to plants during dry periods. These soils are very strongly acid to extremely acid throughout.

St. Johns soils generally are cultivated only where they occur within larger areas of other soils that commonly are used for crops. A few acres are in blueberries. These soils generally provide good sites for excavated ponds. The high water table severely limits use for homesites and for disposal of effluent from septic tanks.

Profile of St. Johns loamy sand in a level wooded area on the east side of Disharoon Road, about 2 miles northwest of Indiantown:

O1—3 inches to 0, litter of partly decomposed leaves and pine needles; many roots at lower boundary.

A11—0 to 11 inches, black (10YR 2/1) light loamy sand; single grain to very weak, medium, granular structure; slightly hard, very friable and loose; common to many roots; many uncoated white quartz grains; extremely acid; clear, wavy boundary.

A12—11 to 17 inches, very dark gray (5Y 3/1) light loamy sand; single grain; loose; common roots; extremely acid; abrupt, wavy to irregular boundary.

B21h—17 to 20 inches, very dusky red (10R 2/2) light loamy sand or fine sand; cemented, hard, very firm, and brittle; a few roots; extremely acid; clear, irregular boundary.

B22h—20 to 28 inches, dark reddish-brown (5YR 2/2) sand or fine sand; massive; cemented; extremely hard, extremely firm, and very brittle; a few roots; very strongly acid to extremely acid; clear, irregular boundary, and tongues of material from this horizon extend into the horizon below in many places.

B3h—28 to 39 inches, brown or dark-brown (7.5YR 4/4) sand; massive; weakly cemented; slightly hard, firm, and brittle; very strongly acid or extremely acid; gradual, wavy boundary.

C1—39 to 50 inches, pale-brown (10YR 6/3) sand that approaches light brownish gray (2.5Y 6/2) as depth increases; single grain; loose; very strongly acid or extremely acid; gradual, wavy boundary.

C2g—50 to 68 inches, pale-olive (5Y 6/3) sand with many faint light brownish-gray (2.5Y 6/2) streaks; single grain; loose; tends to flow when saturated; extremely acid; abrupt, smooth to wavy boundary.

IIC3g—68 to 72 inches, light olive-gray (5Y 6/2) sandy clay loam or sandy clay; massive; dense; very hard, firm, sticky and plastic; extremely acid.

The surface layer is mostly loamy sand, but in some areas the surface layer has a high content of organic matter and is mucky. The A11 or Ap horizon has very weak granular structure or is single grain. As depth increases texture grades from light loamy sand in the A horizon to fine sand or sand in the C horizon. The B horizon varies in hardness and thickness and is hardest in the driest part of summer. In some areas this horizon is soft enough in winter and spring for roots to penetrate, but in places in summer it is dry and almost impermeable. The solum generally is 24 to 39 inches thick. Where the unconforming IIC horizon is at a depth of less than 6 feet, it is always finer textured than the horizon above.

In the A horizon hue ranges from 10YR to 5Y. The Ap horizon is either black or very dark gray. Where an A2 horizon is present, it has a value of 4 to 7 and a chroma generally of 0 or 1. In the B2h horizon hue ranges from 10YR to 10R, value generally is 2 or 3, and chroma commonly is 2 but ranges from 1 to 3. The B3h horizon commonly is not so red as the B2h horizon, and values and chroma in the B3h horizon generally are higher. The C horizon generally has a hue of 10YR or yellower, a value of 4 to 7, and a chroma of 2 or 3 or higher.

St. Johns soils formed in the same or nearly the same kind of material as the moderately well drained Klej soils, the excessively drained Lakeland soils, the somewhat poorly drained Leon soils, the poorly drained to very poorly drained Plummer soils, and the very poorly drained Rutlege soils. St. Johns soils are more poorly drained than Leon soils, and unlike those soils have a black surface layer. St. Johns soils typically have a cemented Bh horizon that is lacking in Rutlege soils.

St. Johns loamy sand (St).—This level and nearly level soil has the profile described as representative of the series. In places this soil occupies wide level areas bounded by sandy ridges. The hardpan in this soil restricts penetration of roots and movement of moisture through the soil. Included in mapping are a few small areas that lack a cemented hardpan.

Wetness is the main limitation that affects use of this soil. Pasture, woodland, and wildlife habitat are suitable uses. Capability unit Vw–5; woodland suitability group 2w7.

St. Johns mucky loamy sand (Su).—This nearly level soil contains more organic matter in its surface layer and is more susceptible to ponding than the soil that has the profile described for the series. The surface layer feels spongy and mucky rather than sandy, and wet material from this layer stains the hands or clothing.

Most areas of this soil are in depressions and remain wooded. In general, the only areas farmed are small and occur in fields consisting chiefly of other soils. If this soil is drained, plowed, and cropped, it loses much of its muckiness within a few years. Erosion is not a hazard. This soil is suited to pasture, woodland, and wildlife habitat. Capability unit Vw–5; woodland suitability group 2w7.

Tidal Marsh

Tidal marsh (Tm) occupies areas along major rivers and along Chincoteague, Sinepuxent, and Assawoman Bays. The soil material has not been examined in detail, but it is sandy to clayey, acid, somewhat salty, and in places contains muck or peat. Some areas contain a large amount of sulfur compounds, and if these areas are reclaimed and drained, the compounds oxidize and form other compounds that are toxic to most plants. The inland areas along the rivers are less affected by salt than the other areas, but all areas are subject to inundation during storms and unusually high tides.

Tidal marsh (fig. 12) is not suited to cultivated crops or trees, but some areas are used to graze ponies. Limitations for building sites are severe. About the only suitable uses

Figure 12.—**Ditch dug in an area of Tidal marsh helps in mosquito control.**

are wildlife habitat and some kinds of recreation. Capability unit VIIIw–1; not used as woodland.

Woodstown Series

The Woodstown series consists of level to gently sloping, moderately well drained soils on uplands. These soils occupy small areas within larger areas of well-drained or poorly drained soils. They have a subsoil of mottled heavy sandy loam or sandy clay loam. The native trees in wooded areas are oaks, red maple, gum, beech, and loblolly pine. In places where the soils were once cleared and cultivated, loblolly pine now grows in almost pure stands.

In a representative profile a mat of decomposed leaves and twigs overlies about 8 inches of olive sandy loam. Below is about 4 inches of light olive-gray sandy loam. The subsoil, between a depth of about 12 and 30 inches, is light yellowish-brown sticky or slightly sticky light sandy clay loam that contains slightly more sand in the lower part and also has yellowish-brown and light-gray mottles in that part. At a depth of about 30 to 45 inches is light brownish-gray crumbly sandy loam that has strong-brown and light yellowish-brown mottles and streaks. Below this is light-gray sandy loam that has brownish-yellow mottles. At a depth of about 64 inches is light brownish-gray loose loamy sand.

Unless they have been limed, Woodstown soils are medium acid or strongly acid. Available moisture capacity is medium to high, and natural fertility is moderate. The response to lime and fertilizer is good.

Most of the acreage of these soils has been cleared and farmed in the past, but only about half of the acreage is now cultivated. The Woodstown soils are preferred for corn and soybeans in the county by some growers because they hold moisture through a longer part of the growing season than some soils that are better drained. Wetness is the main concern of management, and in wet seasons the subsoil is saturated for long periods. The seasonal high water table moderately limits the use of these soils for homesites and for the disposal of effluent from septic tanks, even at sites that may test satisfactorily during dry periods.

Profile of Woodstown sandy loam, 0 to 2 percent slopes, in a now wooded area that once was cultivated, on Brick Kiln Road about 1½ miles southeast of Snow Hill:

O1—3 inches to 1 inch, litter from hardwoods and loblolly pine.

O2—1 inch to 0, mat of decomposed organic material; many fine roots.

Ap—0 to 8 inches, olive (5Y 5/3) sandy loam; weak, fine, granular structure; very friable, slightly sticky and slightly plastic; many roots, very strongly acid; abrupt, smooth boundary.

A2—8 to 12 inches, light olive-gray (5Y 6/2) sandy loam; weak, fine, granular and very fine, subangular blocky structure; friable, slightly sticky and slightly plastic; many roots; some olive (5Y 5/3) material in old root channels; strongly acid; clear, wavy boundary.

B21t—12 to 22 inches, light yellowish-brown (2.5Y 6/4) light sandy clay loam; some yellowish-brown (10YR 5/8) variegations in lower part; weak, fine and medium, blocky structure; hard, friable to firm, sticky and slightly plastic; common roots; thin clay films on vertical faces; strongly acid; clear, smooth boundary.

B22t—22 to 30 inches, light yellowish-brown (2.5Y 6/4) light sandy clay loam or heavy sandy loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles and a few, medium, faint, light-gray (2.5Y 7/2) mottles; weak, fine and medium, subangular blocky structure; hard, firm, slightly sticky and plastic; a few fine roots; faint discontinuous clay films on vertical faces; medium acid and strongly acid; clear, irregular boundary.

C1—30 to 45 inches, light brownish-gray (2.5Y 6/2) sandy loam; common, fine, prominent, strong-brown mottles (7.5 YR 5/8) and common medium, faint, light yellowish-brown (2.5Y 6/4) mottles; massive and very weak, fine, blocky structure; friable, slightly sticky and slightly plastic; inclusions of light-gray (5Y 7/1) loamy sand and sandy clay loam in places; extremely acid; clear, irregular boundary.

C2g—45 to 64 inches, light-gray (N 7/0) sandy loam; a few medium, distinct mottles of brownish yellow (10YR 6/8); single grain to very weak, fine, granular structure; very friable, slightly sticky and slightly plastic; some inclusions of sandy clay loam and loamy sand; very strongly acid; clear, wavy boundary.

C3—64 to 75 inches, light brownish-gray (10YR 6/2) loamy sand; common, fine, faint mottles of brownish yellow (10YR 6/6); single grain; loose, slightly sticky; very strongly acid.

In cultivated areas the Ap horizon is sandy loam or loam and includes part or all of the natural A2 horizon. In areas not cultivated, the A1 horizon normally is 2 to 4 inches thick. In the B horizon structure is weak or moderate. The Bt horizon ranges from heavy sandy loam to sandy clay loam in texture. The C horizon generally is sandy loam, loamy sand, or sand but in places contains pockets of silt or clay. In places a IIC horizon is present instead of a C1 horizon or occurs somewhere below the C1 horizon. The IIC horizon is commonly much coarser textured than the solum, but in places it is any abruptly nonconforming texture. The solum ranges from 24 to 40 inches in thickness.

In the solum hue ranges from 10YR and 5Y but centers on 10YR. In the A1 horizon, value is 3 or 4 and chroma is 1 or 2. In the Ap horizon, value generally is one or two units higher than it is in the A1 horizon and chroma is as high as 3. In the A2 horizon, value is 5 or 6 and chroma commonly is 4 but in places is 2. In the B horizon, value is 5 or 6 and chroma ranges from 4 to 6, but a chroma of 4 is always present in some part of this horizon. In the B21t horizon, hue generally is 10YR. In the B horizon mottles generally are faint or distinct, but in places they are prominent. Depth to mottling generally is about 18 to 26 inches. Mottles that have a chroma as low as 2 normally are not present in the upper 10 inches of the B horizon. The C horizon can be almost any color or mixture of colors and is not always mottled. In places values in dry soil are one or two units higher than those given here for moist soil.

Woodstown soils formed in the same kind of material as the well-drained Sassafras soils, the poorly drained Fallsington soils, and the very poorly drained Pocomoke soils. Woodstown

soils are wetter than Sassafras soils. They are similar to the Mattapex soils in drainage and morphology, but their Bt horizon contains less silt.

Woodstown sandy loam, 0 to 2 percent slopes (WdA).—This soil has the profile described as representative of the series. Included in mapping are a few areas where the surface layer is loamy sand.

If drainage is provided, this soil is well suited to most crops grown in the county. Tile lines are especially well suited to use for improving drainage (fig. 13). Keeping a cover of crops on this soil in winter helps to maintain the content of organic matter and also helps to dispose of unwanted moisture early in spring. Capability unit IIw–5; woodland suitability group 2o5

Woodstown sandy loam, 2 to 5 percent slopes (WdB).—This soil has adequate surface drainage, but tiling or a similar drainage practice generally is needed to remove the excess water in the subsoil.

Included with this soil in mapping are a few areas where slopes are more than 5 percent. Also included are a few areas where the surface layer is loamy sand.

Erosion is the chief concern of management on this Woodstown soil. Capability unit IIe-36; woodland suitability group 2o5.

Woodstown loam, 0 to 2 percent slopes (WoA).—The surface layer and subsoil of this soil contain less sand and more silt or clay, or both, than those in the profile described as representative of the series. The subsoil generally is a little thicker, is somewhat more sticky, and in places is slightly more mottled in the lower part than the one in that soil.

Woodstown loam, 0 to 2 percent slopes, is well suited to corn and soybeans. It is not so easy to drain or work as the Woodstown sandy loams, and it warms a little later in

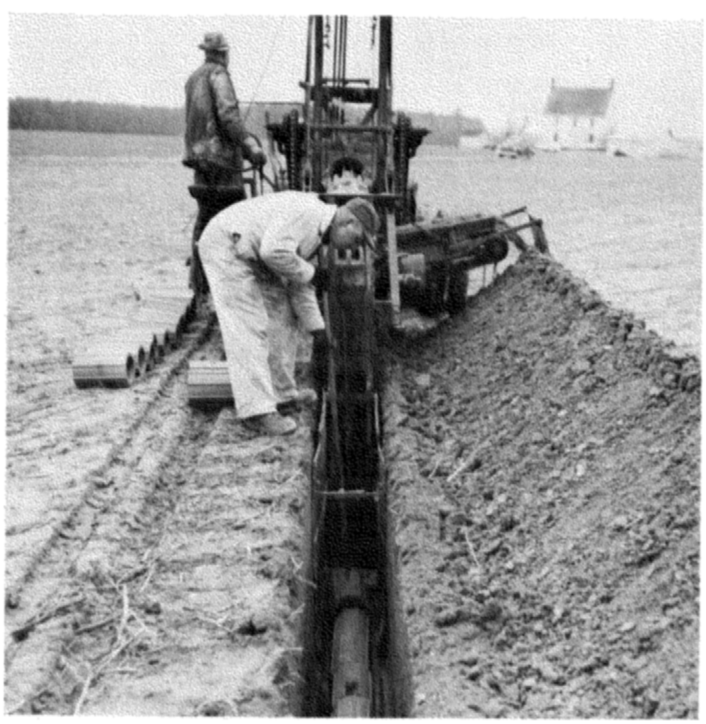

Figure 13.—Installing tile in a field of Woodstown sandy loam, 0 to 2 percent slopes, to improve drainage.

spring. Tile lines or open end ditches can be used to remove excess water. Erosion generally is not a hazard. Capability unit IIw–1; woodland suitability group 2o5.

Woodstown loam, 2 to 5 percent slopes (WoB).—Because of the slopes, runoff is greater on this soil than on Woodstown loam, 0 to 2 percent slopes. Consequently, erosion generally is the chief concern of management. Erosion can be controlled fairly easily by planting hay or some other sod crop at least once every 4 years, by growing cover crops in winter, and by working the soil across the slope. Capability unit IIe–16; woodland suitability group 2o5.

Use and Management of the Soils

This section explains the system of capability classification used by the Soil Conservation Service and describes management of the soils by capability units. Then practices of management that are suitable for all the soils in the county are discussed, and estimates of average yields of the principal crops grown in the county under improved management are given. Finally, management of the soils for woodland, for wildlife, for engineering, and for community development is described.

Capability Grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The groups are made according to the limitations of the soils when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for range, for forest trees, or engineering.

In the capability system, all kinds of soils are grouped at three levels, the capability class, subclass, and unit. These are discussed in the following paragraphs.

Capability Classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

- Class I soils have few limitations that restrict their use.
- Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.
- Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.
- Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife.

Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife.

Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife.

Class VIII soils and landforms have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes.

CAPABILITY SUBCLASSES are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States but not in Worcester County, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife, or recreation.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-4 or IIIe-5. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass.

In the following pages the capability units in Worcester County are described and suggestions for the use and management of the soils are given. The units are not numbered consecutively, because a statewide system is used for numbering the capability units in Maryland, and not all of the units in the system are represented in this county. The names of the soils in any given capability unit can be found by referring to the "Guide to Mapping Units" at the back of this soil survey.

Capability unit I–4

This unit consists of level and nearly level, medium-textured soils of the Matapeake and Sassafras series. These soils are deep and well drained and are on uplands. In places they are slightly eroded.

Soils in this unit retain moisture well and are fairly easy to work. Under good management they are well suited to general crops, certain truck crops, forage crops, pasture, and orchards. Good management includes minimum tillage and leaving all available crop residues on the surface. Legumes and green-manure crops should be grown, and the supply of plant nutrients should be kept high.

Capability unit I–5

This unit consists of level and nearly level, deep, well-drained soils of the Matapeake and Sassafras series. These moderately coarse textured soils are on uplands. In places they are slightly eroded.

Soils in this unit retain moisture well and are easy to work throughout a wide range of moisture content. Under good management these soils are especially suited to truck crops, and they are well suited to most common crops. Good management includes returning all crop residue to the soil, keeping tillage to a minimum, liming as needed, and keeping a cover of grasses and legumes on the soils. Also, the supply of plant nutrients should be kept high. Artificial drainage and special practices to control erosion are not needed.

Capability unit IIe–4

This unit consists of gently sloping, deep, well-drained soils of the Matapeake and Sassafras series. These medium-textured soils are on uplands. They retain moisture well and are fairly easy to work, but they are moderately susceptible to erosion. Some areas are moderately eroded.

These soils are well suited to farming. They generally have better air drainage that makes them more desirable for orchards than level and nearly level soils. Among the practices that reduce runoff and help to control erosion are contour tillage, use of crop residues, and minimum tillage. A suitable cropping system is one that is at least 3 years long and includes a hay crop or another close-growing crop for two-thirds of the time. Growing legumes and green-manure crops help to keep the supply of plant nutrients high. Rotation grazing is a good practice in areas where the soils are used for pasture.

Capability unit IIe–5

In this unit are gently sloping, deep, well-drained soils of the Matapeake and Sassafras series. These moderately coarse textured soils are on uplands where the erosion hazard is moderate, and some areas are eroded.

These soils retain moisture well and are easy to work throughout a wide range of moisture content. They are well suited to most crops. A suitable cropping system is one that is at least 3 years long and includes only one clean-tilled crop in that time. Erosion can be reduced by farming in strips on the contour and keeping a cover of plants on the soils as much of the time as feasible. Diversion terraces that have safe outlets are needed in places on long slopes, and natural drainageways should be kept sodded.

Capability unit IIe–16

In this unit are gently sloping, moderately well drained, medium-textured soils of the Mattapex and Woodstown series. These soils are on uplands. They are moderately susceptible to erosion. The subsoil is moderately permeable to moderately slowly permeable.

The soils in this unit are too wet in some seasons and too dry in others to work easily. Control of erosion generally is the main concern of management. In places, however, drainage is needed to remove excess water, especially early in spring when planting dates can be delayed. Tile drains or open ditches can be used. These soils are suited to most crops, but certain perennial crops can be damaged by frost heaving in winter. A good supply of plant nutrients must be maintained in these soils.

Capability unit IIe–36

This unit consists of gently sloping, moderately well drained soils of the Mattapex and Woodstown series. These moderately coarse textured soils are on uplands. The subsoil is moderately permeable to moderately slowly permeable.

The soils in this unit are easier to work and have a sandier surface layer than those in capability unit IIe–16, and they generally are easier to drain. They are usually wet in spring, and in places planting is delayed. Tile drains or open ditches can be used to provide drainage. Control of erosion is the main concern of management. If erosion is controlled and drainage is provided, these soils are suited to most crops. Some perennial crops are damaged by frost heaving in winter.

Capability unit IIw–1

This unit consists of level and nearly level, moderately well drained, medium-textured soils of the Mattapex and Woodstown series. These soils are on uplands. The subsoil is moderately slowly permeable. These soils are subject to little or no erosion, but in many places drainage is needed.

If the soils in this unit are adequately drained, they are suited to most crops. They are not difficult to drain, and tile drains or open ditches can be used. These soils dry out and warm up more slowly than better drained soils. As a result, some perennial crops are likely to be damaged by frost heaving in winter, and in many years planting dates are delayed in spring.

Capability unit IIw–5

This unit consists of level and nearly level, moderately well drained soils of the Mattapex and Woodstown series. These moderately coarse textured soils are on uplands. The subsoil is moderately slowly permeable to slowly permeable.

Soils in this unit are easier to work and to drain than those in capability unit IIw–1, and their plow layer is sandier. In many places drainage is needed, but drainage generally is not difficult. Tile drains work well, but open ditches also can be used. These soils are slow to dry and to warm, and planting dates are likely to be delayed. If they are adequately drained, these soils are suited to most crops. Certain perennial crops are damaged by frost heaving.

Capability unit IIs–4

This unit consists of level and gently sloping, deep, well-drained soils of the Fort Mott series. These soils are on uplands. Their surface layer is thick and coarse textured. The subsoil is moderately coarse textured and is rapidly permeable.

Soils in this unit are somewhat droughty in dry periods, and this generally is the most important limiting factor in use and management. In places, however, these soils are moderately eroded, and erosion control is needed. The dry sandy surface layer is subject to soil blowing, and a protective cover of plants should be kept on the soils as much of the time as feasible. In places windbreaks are useful, but the most important measures are those that conserve moisture and plant nutrients. Large amounts of fertilizer are needed for most crops, and irrigation is especially desirable during dry periods. Alternating strips of close-growing crops and cultivated crops and farming on the contour help to decrease the speed of runoff and to increase the amount of water absorbed by the soils. These soils warm early in spring. They are suited to early spring crops, especially truck crops.

Capability unit IIIe–4

Matapeake silt loam, 5 to 10 percent slopes, is the only soil in this unit. It is deep and well drained and is on uplands. Some areas are moderately eroded.

Strong slopes limit use of this soil unless practices for conserving soil and water are carefully applied and maintained. Using a cropping system at least 4 years long that includes close-growing plants for most of the time helps to control erosion. Other measures needed for erosion control are minimum tillage, contour stripcropping, and sodded diversions and waterways. In areas used for orchards, the trees should be planted on the contour and a green-manure crop, a cover crop, or sod, should be kept on the soil most of the time.

Capability unit IIIe–5

This unit consists of sloping and strongly sloping, moderately coarse textured soils of the Matapeake and Sassafras series. These soils are deep and well drained. They are on uplands.

Soils in this unit are easier to work and manage than those of capability unit IIIe–4, and their surface layer is sandier and less silty. Erosion can be controlled and moisture conserved by growing tilled crops no more than 1 year in 4 and keeping a protective cover of plants on the soils the other 3 years. Other suitable practices are planting in strips on the contour, constructing diversion terraces, and sodding waterways. The surface layer of these soils should be disturbed as little as possible. Because these soils are somewhat droughtly, irrigation is desirable in long dry periods.

Capability unit IIIe–33

Fort Mott loamy sand, 5 to 10 percent slopes, is the only soil in this unit. It is a deep, somewhat excessively drained, moderately eroded soil that is on uplands. The surface layer is thick and is moderately coarse textured. The subsoil is rapidly permeable.

This soil has steeper slopes than the soils in capability unit IIs–4, and the hazard of water erosion is greater. It is especially well suited to truck crops and other early crops. This soil is seasonally droughty, however, and moisture must be conserved. Supplemental irrigation is needed in dry periods. The main concerns of management nevertheless are water erosion and soil blowing. These can be controlled by using a cropping system at least 4 years long, by farming the soils in narrow strips on the contour, and by protecting the surface with vegetation as much of the time as feasible.

Capability unit IIIw-6

This unit consists of level and nearly level, moderately coarse textured soils of the Fallsington, Pocomoke, and Portsmouth series. These soils are poorly drained and very poorly drained. They are on uplands. The subsoil is moderately permeable to moderately slowly permeable.

In these soils the water table is at or near the surface in winter and spring, and it seldom falls to a depth of much more than 3 feet. Moisture-holding capacity is high, and fertility is moderate. If adequate outlets are available, drainage is not difficult. Tile drains work well, but ditches that penetrate into the loose sandy substratum tend to cave in. Runoff from adjacent higher areas should be intercepted and carried away. If these soils are drained and otherwise are well managed, they are well suited to corn and soybeans and can be used for pasture and hay crops. In gently sloping areas erosion control measures are needed.

Capability unit IIIw-7

This unit consists of level and nearly level, medium-textured soils of the Fallsington, Othello, Pocomoke, and Portsmouth series. These soils are poorly drained and very poorly drained. They are on uplands. The subsoil is moderately permeable and moderately slowly permeable.

In these soils the water table is at or near the surface in winter and spring and seldom falls to a depth of much more than 3 feet. The moisture-holding capacity is high, and the Othello and Portsmouth soils are difficult to work if they are too wet or too dry. If adequate outlets are available, drainage is not difficult. Either tile drains or ditches are suitable. Where tile is used, the rows should be closer together in these soils than in the soils of capability unit IIIw-6. Caving of ditchbanks is a hazard in these soils. Runoff from adjacent higher areas should be intercepted and carried away. If these soils are drained, they are suited to corn, soybeans, and hay and pasture plants. Under good management that includes use of cover crops, the more nearly level soils can be kept in row crops for several years. Erosion control is needed in gently sloping areas.

Capability unit IIIw-9

This unit consists of level and nearly level, poorly drained, medium-textured soils of the Elkton series. These soils are on uplands. Their subsoil is fine textured and very slowly permeable.

The water table is at or near the surface of these soils in winter and in places in spring. The soils of this unit are more difficult to drain than most other poorly drained soils of the county. Tile drains do not function well because of the tight subsoil, and ditches must be closely spaced. Surface drainage can be improved by grading the area between ditches or by planting crops in elevated or graded rows. Where drained, corn and soybeans are grown in these soils, and less commonly, hay or pasture. Erosion generally is not a hazard, but runoff from adjacent higher areas should be intercepted and diverted.

Capability unit IIIw-10

In this unit are level and gently sloping, moderately well drained, coarse-textured soils of the Klej series. These soils have a loose, sandy subsoil.

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Soils in this unit have impeded drainage and are very strongly acid. They are low in plant nutrients and are very rapidly permeable. Although these soils have a high water table in wet seasons, they hold little moisture available to plants in dry seasons. Drainage is not difficult, but ditches are difficult to maintain because these sandy soils flow when saturated and fill the ditches.

These soils are suited to most crops, though the well-drained, medium-textured soils in the county that are farmed are better suited. They are used chiefly for corn and soybeans. Crops on these soils grow fairly well if the supply of plant nutrients is maintained and if irrigation water is provided in dry periods.

Capability unit IIIw-11

Elkton sandy loam is the only soil in this unit. It is level and nearly level, moderately coarse textured, and poorly drained and has a very slowly permeable subsoil. The surface layer is sandier than that of the soils in unit IIIw-9, and this soil therefore is easier to work and to drain.

This soil can be drained more readily by ditching than by tiling, because tile lines do not function well in the tight subsoil. If drainage is improved, this soil is suited to corn and soybeans, and these are the crops commonly grown.

Capability unit IIIs-1

This unit consists of level and gently sloping, coarse-textured soils of the Fort Mott and Lakeland series that are underlain by finer textured material. These acid soils are deep and are excessively drained. The content of plant nutrients and organic matter is low, permeability is rapid, and the soils retain little moisture. These soils are highly susceptible to soil blowing and should be kept protected by a vegetative cover.

The soils in this unit are especially suited to truck crops, but they are used for corn and soybeans. Care should be taken not to overlime these sandy soils. Good management includes the use of close-growing crops, planting crops in strips at right angles to the direction of strong winds, and establishing and maintaining windbreaks. Crop residue should be kept on or near the surface. Annual crops benefit from supplemental irrigation, especially in dry seasons. During dry periods, trees and other deep-rooted perennials generally can obtain moisture in the sandy loam or sandy clay loam material that commonly is at a depth of 5 to 7 feet.

Capability unit IVe-3

This unit consists of sloping and moderately steep, medium-textured soils of the Matapeake series. These soils are deep and well drained. Some areas are severely eroded, and the hazard of further erosion is severe.

Practices that help to control erosion on these soils are stripcropping, cultivating on the contour, establishing a buffer strip, and leaving all crop residues on the surface or turning them under. In places terracing is required. Diversions and sodded waterways can be used to dispose of runoff, especially that from terrace channels. A long cropping system should be used, and a cover of plants should be kept on the soil for most of the time. Because of the hazard of further erosion, soybeans are not well suited to these soils.

Capability unit IVe-5

This unit consists of sloping and moderately steep, moderately coarse textured and coarse textured soils of the Fort Mott and Sassafras series. These soils are deep and well drained and are on uplands. Many areas are eroded.

These soils are easy to work and warm fairly early in spring, but they are severely limited for crops by the hazard of erosion. If these soils are used for crops, a cropping system is needed that includes close-growing crops at least 4 years in 5. In such a cropping system, a tilled crop can be grown for 1 year if it is planted in narrow strips on the contour. A safer use is permanent hay or pasture or contoured orchards that have a permanent ground cover. Measures are needed for control of erosion and must be carefully applied. Irrigation is desirable if it is economically feasible. Moisture must be conserved, particularly in the Fort Mott soils because they hold less moisture than the Sassafras soils, which hold a moderate amount of moisture.

Capability unit IVw-6

This unit consists of level soils of the Plummer and Rutlege series. These soils are sandy throughout. They are poorly drained, and the water table is at or near the surface for long periods. Their natural fertility is low and they are very strongly acid.

Soils of this unit can be drained by tile or ditches, but tile is expensive and ditches cave in and lose water by overflow. Once these soils are drained they are suited to corn, soybeans, blueberries, and certain truck and garden crops. They are poorly suited to hay and pasture. Irrigation is beneficial in dry seasons but is economically feasible only if truck crops and other crops of high value are grown.

Capability unit IVw-7

In this unit are very poorly drained, extremely acid Muck soils that are subject to flooding. These organic soils generally are not farmed, but they can be used for crops if they are drained and adequately limed and fertilized. Where drainage is improved, however, the organic material shrinks and subsides as it dries, and this increases the risk of flooding. Most areas of Muck remain wooded. These areas furnish wood products and make excellent habitat for some kinds of wildlife.

Capability unit IVs-1

This unit consists of deep, level to sloping, sandy soils of the Fort Mott and Lakeland series. These soils are excessively drained and rapidly permeable.

They have very low or low available moisture capacity and are seasonally droughty. Natural fertility is low. These soils are susceptible to water erosion and soil blowing.

The soils in this unit can be used for corn and soybeans and are especially well suited to early truck crops. Good management includes the use of close-growing crops in the cropping system, stripcropping at right angles to the prevailing wind, and establishing windbreaks. The content of organic matter can be increased by turning under all available crop residue and by adding chicken litter. Irrigation water benefits crops in dry years.

Capability unit Vw-5

This unit consists of somewhat poorly drained and very poorly drained, sandy soils of the Leon and St. Johns series. These soils have an organic hardpan in the subsoil, have a high water table, and are very strongly acid or extremely acid.

Soils in this unit are too wet, too acid, and too low in natural fertility to produce most crops economically. If these soils are drained, they are droughty during dry seasons. These soils generally are used as woodland, as unimproved pasture, and as wildlife habitat. Under special management these soils can be used for special local crops as blueberries.

Capability unit VIe-2

This unit consists of deep, steep, well-drained soils of the Matapeake and Sassafras series. These soils are not suited to cultivation, and a cover of sod should be kept on the areas. In places the soils are suitable for orchards that are planted on the contour. These soils also can be used for improved pasture, but care is needed to prevent seasonal overgrazing and other damage to the sod that may expose the soil to severe erosion. Areas not needed for hay, orchards, or pasture should be used as woodland. Careful management is needed in all wooded areas to ensure adequate watershed protection and best returns.

Capability unit VIw-1

Only Mixed alluvial land is in this unit. This land is on flood plains that are subject to flooding. It consists of recently deposited variable soil material that is mostly very poorly drained.

This land generally is wet and is not suited to cultivated crops. Pasture is a suitable use, but preparing an uncleared area for grazing is costly. In cleared areas, grasses and legumes that tolerate wetness can be planted for pasture. Weeds must be controlled, and grazing should be done only when the land is not too wet. Areas now in trees should remain wooded, and some cleared areas should be planted to trees. Such areas can be managed for wood products. This land can also be used for wildlife habitat and for some kinds of recreation. In many places it is suitable as sites for ponds and small lakes.

Capability unit VIIs-1

This unit consists of sloping to steep, sandy soils of the Lakeland series. These soils are excessively drained and rapidly permeable.

Droughtiness and steep slopes severely limit these soils for most uses. These soils are not suited to crops and pasture, but in places they can be used for limited grazing or as shelter for livestock. They generally are not suited to trees. Virginia pine can be grown for pulpwood, however, and loblolly pine grows fairly well. Areas of these soils provide suitable habitat for certain kinds of wildlife, and they are suited to some kinds of recreation.

Capability unit VIIIw-1

Only Tidal marsh is in this unit. It consists of marshland that is regularly flooded by salt water. This land type is not suited to farming, but the marshes and their waterways provide habitat for waterfowl, muskrats, and other kinds of wildlife.

Capability unit VIIIs-2

This unit consists of level and gently sloping Coastal beaches that border the bays and ocean. These beaches are

mainly suited to recreation and are not suitable for farming. In some areas it is desirable to stabilize the areas to help control blowing, drifting, and washing of the sand and the resulting damage to beaches and adjacent areas.

Capability unit VIIIs-4

Only Gravel and borrow pits is in this unit. These areas cannot be used for farming unless they are completely reclaimed. The soil material is infertile, and plants cannot grow in it.

General Management Requirements

Some of the management practices needed to obtain a good growth of crops and, at the same time, to control erosion can be conveniently summarized for all the soils of the county. Among these practices are the drainage of wet soils, irrigation of soils in dry years, use of adequate soil amendments, and proper tillage.

Drainage

About three-fourths of the acreage of all soils suitable for crops in Worcester County need some degree of artificial drainage for good growth of crops. Only a few farms are located entirely on well-drained soils. Of the acreage that requires drainage, 79 percent is poorly drained or very poorly drained, and 21 percent is moderately well drained. The amount of drainage has a marked effect on root development (fig. 14).

Soils in the county are seasonally saturated because of a high water table or because of a perched water table above a slowly permeable layer. Most plants in these saturated areas have shallow roots that do not grow deep enough to obtain a good supply of water in dry periods.

Soils that do not require drainage are in the Fort Mott, Lakeland, Matapeake, and Sassafras series. These soils occupy about 23 percent of the county.

Soils that require moderate drainage before they are farmed are in the Klej, Mattapex, and Woodstown series. These soils occupy about 14 percent of the county.

Soils that require intensive drainage are in the Elkton, Fallsington, Leon, Othello, and Plummer series. These soils occupy about 34 percent of the county.

Soils that require very intensive artificial drainage for farming are Muck and those of the Pocomoke, Portsmouth, Rutlege, and St. Johns series. These soils occupy about 18 percent of the county. In some areas the surface of these soils becomes ponded if the soil is not properly drained.

Ditchbanks are difficult to maintain in shallow soils that are underlain by loose sandy material because the sandy material caves in and partly fills the ditches. In such soils tile drains are likely to require less maintenance than ditches. If ditches are used, all ditchbanks should be stabilized with vegetation. In Elkton soils and in other deep coherent soils, ditches are less likely to lose flow area through siltation and are easier to maintain than those in sandy soils. Initial construction of ditches in the coherent soils, however, is likely to be more expensive.

Irrigation

The amount and distribution of rainfall in Worcester County generally are adequate for the growth of crops, but there are dry years when irrigation can be the means of sustaining crop growth. Information concerning irrigation is given in the "Maryland Guide for Sprinkler Irrigation," which was prepared by the Soil Conservation Service and the Maryland Agricultural Experiment Station. It can be obtained from the Maryland Agricultural Extension Service or the Maryland Agricultural Experiment Station. Features that affect the suitability of individual soils for irrigation are given in table 6, in the section "Engineering Uses of the Soils."

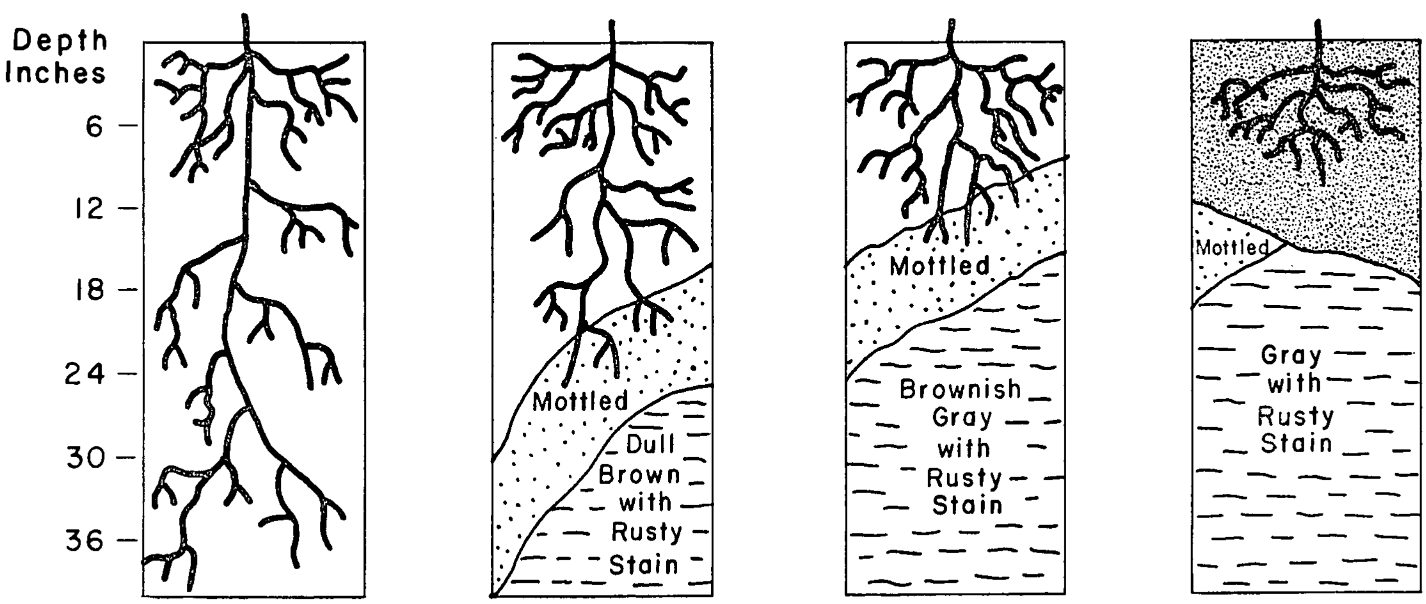

Figure 14.—**Effect of soil drainage on root development. Far left illustration shows extensive development in well-drained soil; second from left shows somewhat limited development in moderately well drained soil; third from left shows restricted development in poorly drained soil; far right shows extremely restricted development in very poorly drained soil.**

Soil amendments

The soils in this county are naturally moderate to low in plant nutrients. All of the soils are acid, and some are extremely acid. For these reasons, additions of lime and fertilizer are needed for most crops. The amount of lime and the kind and amount of fertilizer needed can be determined by soil tests. Assistance in determining the specific requirement on each soil can be obtained from the county extension agent, who will arrange to have soils tested at the Soil Testing Laboratory of the University of Maryland.

Lime generally is needed about once every 2 or 3 years. On very sandy soils and on well drained or moderately well drained soils, the amount of lime needed is about 1 to 1½ tons per acre. On most of the other soils, the amount needed is 2 to 3 tons per acre. On Pocomoke and Portsmouth soils, however, and on other wet soils that have a high content of organic matter, the requirement per acre may be 5 tons or more. Excessive amounts of lime are damaging, particularly on sandy soils.

Manure furnishes nitrogen and organic matter and smaller amounts of other plant nutrients. In Worcester County manure is an important byproduct of the poultry industry, and large amounts of it are applied to cultivated fields each year, mostly to sandy soils (fig. 15).

Tillage

On all soils of the county, tillage should be limited to that needed for quick germination of seeds, the adequate growth of seedlings, and the maturing of a normal crop. Keeping tillage to a minimum is effective in reducing erosion and the breakdown of soil structure.

The continued use of heavy machinery compacts many kinds of soils and makes them difficult to work. The damage is most likely to occur on moderately well drained to very poorly drained soils that are normally moist and wet in spring.

Assistance in planning and laying out cropping strips can be obtained from the Worcester Soil Conservation District.

Residue management

Leaving all available crop residue in the field provides excellent protection against erosion until plowing is done. The residue finally incorporated into the soil improves soil structure, promotes aeration and infiltration of water, and decreases the amount and rate of runoff. For example, if all residue is left on the field where corn is grown year after year, the amount of soil lost through water erosion is reduced by 10 to 25 percent, depending on tillage practices and the amount of corn grown per acre. Even in a cropping system where close-growing crops protect the soil most of the time, residue from corn, other row crops, and small grains reduces losses of soil through water erosion by 3 to 5 percent.

In Worcester County soil blowing is also a hazard, particularly on light sandy soils that are more readily blown by wind than heavier soils. Residue left on the surface prevents most soil blowing (fig. 16), however, and traps much of the sand that is blown from less protected areas. Even residue only partly turned under helps to check loss of soil by blowing, because the parts that protrude serve as miniature but effective windbreaks.

Estimated Yields

Table 2 shows the estimated average yields per acre of the principal crops grown in the county under improved management. Yields are not listed for Coastal beaches, Gravel and borrow pits, Made land, Mixed alluvial land, and Tidal marsh, because crops or pasture are not grown on these areas.

The yields given in the table are those that are obtained under management followed by farmers who use good conservation practices. This level of management is considered high, and at this level each soil is used within its capability.

To obtain the yields listed in table 2, all or nearly all of the following practices are needed:

1. Contour tillage, stripcropping, terracing, minimum tillage, and similar practices are used to help control erosion on soils that are suitable for cultivation but susceptible to erosion; the soils that

Figure 15.—Spreading poultry manure on Klej loamy sand, 0 to 2 percent slopes.

Figure 16.—Shredding cornstalks on a Woodstown sandy loam helps to reduce the risk of damage from soil blowing.

TABLE 2.—*Estimated average yields per acre of principal crops grown under improved, or high-level, management*

[Absence of yield figure indicates that crop is not suited to the soil or is not commonly grown on it]

Soil	Corn	Soybeans	Sweetpotatoes	Tomatoes	Winter barley	Cucumbers	Alfalfa hay	Clover-grass hay	Lespedeza		Tall grass pasture
									Hay	Seed	
	Bu.	*Bu.*	*Bu.*	*Tons*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Lbs.*	*Cow-acre-days* [1]
Elkton sandy loam	105	40		15				3.5			200
Elkton loam	105	40		12				3.5			200
Elkton silt loam	105	40						3.5			200
Fallsington sandy loam	120	35		14	45	350		3.0	1.9	265	170
Fallsington loam	120	35		13	45	300		3.0	1.9	265	170
Fort Mott loamy sand, 0 to 2 percent slopes	110	40	500	15	57	450	5.0	3.5	2.1	300	285
Fort Mott loamy sand, 2 to 5 percent slopes	110	40	425	15	55	450	5.0	3.5	2.0	295	285
Fort Mott loamy sand, 5 to 10 percent slopes	100	40	425		54		4.5	3.0	2.0	295	255
Fort Mott loamy sand, 5 to 10 percent slopes, severely eroded	70							3.0			
Fort Mott loamy sand, 10 to 15 percent slopes	80							2.7			205
Klej loamy sand, 0 to 2 percent slopes	110	30	425	10	48	300	3.1	3.0	1.6	250	170
Klej loamy sand, 2 to 5 percent slopes	110	30	425	10	51	300	3.4	3.0	1.7	260	170
Lakeland sand, 5 to 15 percent slopes									1.0	180	
Lakeland loamy sand, 5 to 15 percent slopes						300			1.3	225	80
Lakeland loamy sand, 15 to 30 percent slopes									.9	150	
Lakeland sand, clayey substratum, 0 to 5 percent slopes	85	25	350		45	300	2.5	2.0	1.5	235	145
Lakeland loamy sand, clayey substratum, 0 to 5 percent slopes	90	30	450	15	50	450	2.5	2.0	1.8	270	145
Lakeland-Fort Mott loamy sands, 0 to 5 percent slopes	100	35	450	15	50	450	3.5	2.5	1.8	270	215
Lakeland-Fort Mott loamy sands, 5 to 10 percent slopes	100	35	450	15	50	450	3.5	2.5	1.8	270	215
Leon loamy sand	60	20				250		2.0			115
Matapeake fine sandy loam, 0 to 2 percent slopes	140	45		20	62	350	5.5	3.5	2.3	330	315
Matapeake fine sandy loam, 2 to 5 percent slopes	140	45		18	60	350	5.5	3.5	2.2	320	315
Matapeake fine sandy loam, 5 to 10 percent slopes	130	40		18	60	350	5.0	3.5	2.3	330	285
Matapeake silt loam, 0 to 2 percent slopes	140	45		18	62		5.5	3.5	2.3	330	315
Matapeake silt loam, 2 to 5 percent slopes	140	45		18	60		5.5	3.5	2.2	320	315
Matapeake silt loam, 5 to 10 percent slopes	130	40			59		5.0	3.5	2.2	320	285
Matapeake soils, 5 to 10 percent slopes, severely eroded	110						4.5	3.0	2.1	300	255
Matapeake soils, 10 to 15 percent slopes	110	35					4.5	3.0	2.1	300	255
Matapeake soils, 15 to 30 percent slopes									1.5	250	230
Mattapex fine sandy loam, 0 to 2 percent slopes	135	45		18	60		4.5	3.5	2.1	300	255
Mattapex fine sandy loam, 2 to 5 percent slopes	135	45		18	60		4.5	3.5	3.1	300	255
Mattapex loam, 0 to 2 percent slopes	135	45		16	56		4.5	3.5	2.2	300	255
Mattapex loam, 2 to 5 percent slopes	135	45		16	59		4.5	3.5	2.3	315	255
Mattapex silt loam, 0 to 2 percent slopes	135	45		15	56		4.5	3.5	2.2	300	255
Mattapex silt loam, 2 to 5 percent slopes	135	45		15	59		4.5	3.5	2.3	315	255
Muck								2.7			140
Othello silt loam	115	40		15	47			3.5			200
Plummer loamy sand	60	20		15		300		2.0			115
Pocomoke sandy loam	110	40		11	45	300		3.5			200
Pocomoke loam	110	40		15	45			3.5			200
Portsmouth sandy loam	110	40		10	47			3.5			
Portsmouth silt loam	110	40		10	47			3.5			
Rutlege loamy sand	60	20						2.0			115

See footnote at end of table.

TABLE 2.—*Estimated average yields per acre of principal crops grown under improved, or high-level, management*—Con.

Soil	Corn	Soy-beans	Sweet-pota-toes	Toma-toes	Winter barley	Cucum-bers	Alfalfa hay	Clover-grass hay	Lespedeza		Tall grass pasture
									Hay	Seed	
	Bu.	*Bu.*	*Bu.*	*Tons*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Lbs.*	*Cow-acre-days* [1]
Sassafras sandy loam, 0 to 2 percent slopes	130	45	450	19	60	450	5.5	3.5	2.2	315	315
Sassafras sandy loam, 2 to 5 percent slopes, moderately eroded	130	45	450	15	58	450	5.5	3.5	2.2	310	285
Sassafras sandy loam, 5 to 10 percent slopes, moderately eroded	120	40	425	--------	55	--------	5.0	3.5	2.1	300	285
Sassafras sandy loam, 5 to 10 percent slopes, severely eroded	100	------	--------	--------	--------	--------	4.5	3.0	2.0	295	255
Sassafras sandy loam, 10 to 15 percent slopes	100	------	--------	--------	--------	--------	4.5	3.0	2.0	295	255
Sassafras sandy loam, 15 to 30 percent slopes	------	------	--------	--------	--------	--------	--------	--------	------	------	230
Sassafras loam, 0 to 2 percent slopes	130	45	450	20	60	450	5.5	3.5	2.2	315	315
Sassafras loam, 2 to 5 percent slopes, moderately eroded	130	45	450	16	58	450	5.5	3.5	2.2	315	315
St. Johns loamy sand	65	20	--------	--------	--------	--------	--------	2.0	------	------	115
St. Johns mucky loamy sand	65	20	--------	--------	--------	--------	--------	2.0	------	------	115
Woodstown sandy loam, 0 to 2 percent slopes	130	40	425	14	54	400	4.5	3.5	2.0	280	255
Woodstown sandy loam, 2 to 5 percent slopes	130	40	425	14	57	400	4.5	3.5	2.1	295	255
Woodstown loam, 0 to 2 percent slopes	130	40	--------	14	54	400	4.5	3.5	2.0	280	255
Woodstown loam, 2 to 5 percent slopes	130	40	--------	14	57	400	4.5	3.5	2.1	290	255

[1] Cow-acre-days is a term used to express the carrying capacity of pasture. It is the number of animal units carried per acre multiplied by the number of days the pasture is grazed during a single grazing season without injury to the sod. For example, an acre of pasture that provides 30 days of grazing for two cows has a carrying capacity of 60 cow-acre-days.

need drainage are adequately drained; excess water is disposed of safely; and irrigation water is supplied to the soils and crops that need it.

2. Cropping systems are of adequate length. They generally consist of a tilled crop that helps to control weeds, a deep-rooted crop that improves soil permeability, legumes for 1 or more years to help maintain or improve fertility, and a close-growing crop or a green-manure crop. A close-growing crop or a green-manure crop helps to improve structure and tilth, supplies organic matter, and reduces erosion.
3. Manure and crop residue are turned under to supply organic matter, as well as nitrogen and other plant nutrients. This also improves tilth and aids in controlling soil losses.
4. Fertilizer and lime are applied according to needs indicated by soil tests.
5. Suitable methods of plowing, preparing the seedbed, and cultivating are used, but cultivation is kept to a minimum.
6. Planting, cultivating, and harvesting are done at the right time and in the right way.
7. Weeds, diseases, and insects are controlled.
8. Crop varieties suited to the soils are selected for planting.

The yields shown in table 2 are not presumed to be the highest yields obtainable, but they set a goal that is practical for most farmers to reach if they use good management. Yields on the same soil can be expected to vary because of differences in management, in the weather, in the varieties of crops grown, and in the numbers of kinds of insects, diseases, and weeds.

More information about management practices needed to obtain good growth of crops is given in the subsections "Capability Grouping" and "General Management Requirements."

Use of the Soils as Woodland [2]

Woodland occupies about 62 percent of Worcester County, or more than 191,000 acres. Trees harvested from wooded areas are used for lumber, poles and piling, veneer for furniture and baskets, and pulpwood. Much of the hardwood is used locally for constructing poultry houses, and much of the sawdust and bark is salvaged for use as poultry litter.

Lumbering has been an important industry in the county for many years. In 1963, according to the Maryland Department of Forests and Parks, 38 million board feet of timber were harvested and the county ranked first in the State in cash sales of timber. Most timber is processed outside the county. In 1966, however, a plant was built near Pocomoke City for manufacturing plywood and processing logs into chips for paper.

The woodlands in the county are made up mainly of hardwoods and pines, including two of the most valuable species in the State—sweetgum and loblolly pine (fig. 17).

[2] By C. L. SEWELL, district forester, Maryland Department of Forests and Parks, and ROSS MELLINGER, woodland conservationist, Soil Conservation Service.

Figure 17.—**Loblolly pine logs on the way to a local sawmill. The mats under the wheels enable the truck to move over wet soil.**

Such hardwoods as oaks, yellow-poplar, sweetgum, and red maple grow in most parts of the county and occupy about 19 percent of the wooded acreage. Loblolly pine occurs in much of the county, but it does not grow in droughty soils. Also, few if any trees suitable for timber grow in soils in low areas that are flooded by salt water. Pond pine is common in some of the wetter areas, and shortleaf pine and Virginia pine grow in some of the sandy, droughty soils. On flood plains the main trees are green ash, red maple, redgum, blackgum, and baldcypress, though pond pine and loblolly pine grow in some areas on these plains.

All of the woodland in the county is second growth. In about one-fourth of the stands, the trees are not of the best species and the stands are less than fully stocked. The woodland should be managed so that loblolly pine, sweetgum, and a few yellow-poplars grow in fully stocked stands that are well suited to each soil.

At least 85 percent of the land area of Worcester County is suitable for producing loblolly pine commercially, and more than 30 percent can be highly productive of this valuable tree. In addition more than 30 percent of the acreage is well suited to sweetgum and yellow-poplar. The potential of the soils for producing such valuable trees is an important factor in planning for long-term use, particularly of wet soils that need artificial drainage.

Woodland suitability groups

The soils of Worcester County have been placed in woodland suitability groups to help owners plan the use of their soils for wood crops. Each group is made up of soils that are suited to about the same kinds of trees, that require similar management, and that have about the same potential productivity. The names of the soil series represented in each group are mentioned in describing that group, but this does not imply that all the soils of a series are in the group. The names of all soils in any woodland group can be found by referring to the "Guide to Mapping Units" at the back of this survey.

Each woodland suitability group is identified by a three-part symbol, such as 3r10 and 3r14. The three parts of a symbol indicate, respectively, suitability class, subclass, and group. The first part of the symbol, always a number, indicates woodland suitability class or relative potential productivity of the soils. The potential productivity of a soil for trees is expressed as the site index, which is the average height, in feet, that the dominant trees in a natural unmanaged stand will reach in 50 years. For the soils of Worcester County, site indexes have been determined only for loblolly pine. If the site index of loblolly pine is 90, for example, on a given soil, the dominant trees have an average height of 90 feet when they are 50 years old.

Three classes are recognized in this county—2, 3, and 6. For soils of class 2, the site index is 85 to 95 and potential productivity is very good; for class 3, the site index is 75 to 85 and potential productivity is good; and for class 6, the site index is less than 55 and potential productivity is very poor.

The second part of the symbol identifying a woodland suitability group is a lower case letter. This letter indicates an important soil property that imposes a moderate or severe hazard or limitation in managing soils of the woodland group. In Worcester County four subclasses are recognized. These are *o*, *r*, *s*, and *w*. A letter *o* shows that the soils have few limitations that restrict their use for trees; *r* shows that the main limitation is steep slopes; *s* shows that the soils are sandy; and *w* shows that wetness is the chief limitation.

The third part of the symbol indicates degree of hazard or limitation and general suitability of the soils for certain kinds of trees. Woodland groups 3o10 and 3o13, for example, are both in class 3 and subclass *o*, but they differ in degree of major limitations.

Important in the descriptions of the woodland suitability groups are the ratings *slight*, *moderate*, and *severe*, which indicate the relative hazard or limitation for factors that most affect woodland management. These factors are windthrow hazard, erosion hazard, plant competition, seedling mortality, and equipment limitations.

A rating of *slight* means that no special problems are recognized, and that use of the soils for trees would not be affected, except as indicated by that special hazard. A rating of *moderate* means that use of the soils for trees would be affected by the stated hazard, but not to the extent of precluding use, and that ordinary management practices give adequate control. A rating of *severe* means that the stated hazard makes management of the soils for trees impractical or that difficult or expensive practices are required for control.

Windthrow hazard measures the effect of the soils on root development and the ability of the soil to hold trees firmly. Plummer soils, for example, have a slight to moderate windthrow hazard, and Leon and St. Johns soils have a moderate to severe windthrow hazard. The hazard of windthrow is slight on all other soils of the county.

Erosion hazard refers to erodibility when the soils are not fully protected by protective cover or where logging roads and skid trails may have penetrated into the subsoil. The hazard of erosion is moderate on a few soils in the county that have slopes of more than 15 percent, but otherwise the erosion hazard is slight.

Plant competition is rated on the basis of the degree to which unwanted plants invade openings in the tree canopy. In Worcester County hardwoods are the main competition for pine trees. On the other hand, shrubs, vines, weeds, and undesirable hardwoods compete with desirable species of hardwoods.

Seedling mortality refers to the expected degree of mortality of either natural or planted seedlings. Seasonal wetness and droughtiness are the main characteristics of the soil that influence the degree of mortality.

Equipment limitations are rated on basis of soil characteristics that restrict or prohibit the use of equipment commonly used for tending and harvesting trees. In Worcester County some soils are limited because of loose sandy material in their surface layer or because of slopes of more than 15 percent. The most limitating factor is wetness during the period when most timber is harvested.

In the following pages the woodland suitability groups of Worcester County are described. The groups are not numbered consecutively because they are part of a nationally used system and not all groups in the system are represented in the county. Not placed in woodland suitability groups are the land types Gravel and borrow pits, Made land, Muck, and Tidal marsh.

WOODLAND SUITABILITY GROUP 2o5

This group is made of level and gently sloping, moderately well drained soils of the Woodstown series. Available moisture capacity is medium to high in these soils, and natural fertility is moderate.

These soils are well suited to loblolly pine, oaks, sweetgum, yellow-poplar, and red maple. Loblolly pine, sweetgum, and yellow-poplar are the trees favored for planting for wood crops. Suitable for Christmas trees are Scotch pine, white pine, and Norway spruce.

Seedling mortality and equipment limitations are slight. Plant competition is severe for conifers and moderate for hardwoods.

The average site index for loblolly pine is 86. The yearly maximum expected yield per acre at 50 years of age is nearly 700 board feet for loblolly pine, nearly 500 board feet for yellow-poplar, and nearly 275 board feet for oak.

WOODLAND SUITABILITY GROUP 2w7

In this group are level and nearly level, somewhat poorly drained to very poorly drained soils of the Fallsington, Leon, Plummer, Pocomoke, Portsmouth, and St. Johns series and the land type Mixed alluvial land. Available moisture capacity is high and natural fertility is moderate in the Fallsington, Pocomoke, and Portsmouth soils, but they are lower in the other soils of this group.

These soils are well suited to loblolly pine, oaks, blackgum, and sycamore. Leon, Plummer, and St. Johns soils are better suited to sweetgum than to blackgum or sycamore. Loblolly pine and sweet gum are favored for planting for wood crops. White pine is preferred for Christmas trees.

Because of wetness, seedling mortality is severe in these soils. Plant competition is severe for conifers and for hardwoods. Equipment limitations are severe because of the high water table.

The site index for loblolly pine ranges from 85 to 95. The yearly maximum expected yield per acre at 50 years of age is nearly 700 board feet, but it is slightly less than this on the Leon and Plummer soils.

WOODLAND SUITABILITY GROUP 3o10

In this group are deep, level to moderately steep, well-drained soils of the Fort Mott, Metapeake, and Sassafras series. Available moisture capacity is high or moderate and natural fertility is moderate in the Matapeake and Sassafras soils. In Fort Mott soils, however, available moisture capacity is low to moderate and natural fertility is low. Some areas are moderately eroded, and others are severely eroded.

These soils are well suited to oaks, loblolly pine, yellow-poplar, and Virginia pine. Loblolly pine, yellow-poplar, and sweetgum are the trees preferred for planting for wood crops. Scotch pine and white pine are preferred species for Christmas trees.

Equipment limitations are slight on these soils. Seedling mortality is slight to moderate on the severely eroded soils. Plant competition is slight for hardwoods and moderate for conifers.

The site index for loblolly pine ranges from about 68 to 83. The yearly maximum expected yield per acre at 50 years of age is about 470 board feet for loblolly pine and about 200 board feet for oak. Matapeake soils are slightly more productive than the other soils of this group. Yields are somewhat less on severely eroded soils than on moderately eroded soils.

WOODLAND SUITABILITY GROUP 3o13

This group is made up of level and gently sloping, moderately well drained, loamy soils of the Mattapex series. Available moisture capacity is high in these soils, and natural fertility is moderate.

These soils are well suited to loblolly pine, oaks, sweetgum, and red maple. Loblolly pine and sweetgum are the trees favored for planting for wood crops. Suitable for Christmas trees are Scotch pine and white pine.

Seedling mortality and equipment limitations are slight on these soils. Plant competition is moderate for conifers and slight for hardwoods.

The site index for loblolly pine ranges between about 76 and 86, and the expected yield per acre at 50 years of age is about 470 board feet.

WOODLAND SUITABILITY GROUP 3r10

This group consists of steep, well-drained, deep soils of the Matapeake and Sassafras series. Available moisture capacity is moderate to high in these soils, and natural fertility is moderate.

These soils are well suited to oaks, loblolly pine, yellow-poplar, and Virginia pine. Loblolly pine, yellow-poplar, and sweetgum are preferred for planting for wood crops. Suitable for Christmas trees are Scotch pine and white pine.

Seedling mortality is slight. Plant competition is moderate for conifers and slight for hardwoods. Equipment limitations are moderate because of the steep slopes. In places the hazard of erosion is moderate, particularly on the Matapeake soils.

The site index for loblolly pine ranges from about 68 to 83. The yearly maximum expected yield per acre at 50 years of age is about 470 board feet for lolbolly pine and 200 board feet for oak. Yields are slightly less on Sassafras soils than on Matapeake soils.

WOODLAND SUITABILITY GROUP 3s13

This group consists of level and gently sloping, moderately well drained, sandy soils of the Klej series. Available moisture capacity and natural fertility are low in these soils.

These soils are well suited to loblolly pine, oaks, sweetgum, and red maple. Loblolly pine and sweetgum are preferred for planting for wood crops. Scotch pine, white pine, Norway spruce, and Virginia pine are preferred for Christmas trees.

Seedling mortality is slight. Plant competition is moderate for conifers and slight for hardwoods. Because of the sandy surface layer and the seasonally high water table, equipment limitations are moderate.

The site index for loblolly pine ranges from 75 to 85, and the yearly maximum expected yield per acre at 50 years of age is about 470 board feet.

WOODLAND SUITABILITY GROUP 3s14

In this group are gently sloping to moderately steep, excessively drained, deep soils of the Fort Mott and Lakeland series. These soils are sandy throughout. Available moisture capacity is very low, and natural fertility is low in these soils.

These soils are well suited to loblolly pine, oaks, shortleaf pine, and Virgina pine. Loblolly pine and Virginia pine are favored for planting for wood crops, though Virginia pine and shortleaf pine are preferred in most places on droughty sites. Suitable for Cristmas trees are Scotch pine, white pine, and Virginia pine.

Seedling mortality is moderate because of droughtiness. Plant competition is moderate for conifers and slight for hardwoods. Because of the loose sandy surface layer, equipment limitations are moderate.

The site index for loblolly pine ranges between 75 and 85, and the yearly maximum expected yield per acre is about 470 board feet. Annual yields of one cord per acre of Virginia pine pulpwood can be expected in stands of trees that are 30 years old.

WOODLAND SUITABILITY GROUP 3s15

Lakeland loamy sand, 15 to 30 percent slopes, is the only soil in this group. This deep sandy soil is steep, and it is excessively drained. Available moisture capacity is very low, and natural fertility is low.

This soil is well suited to loblolly pine, oaks, shortleaf pine, and Virginia pine. Loblolly pine, shortleaf pine, and Virginia pine are favored for planting for wood crops. Scotch pine, white pine, and Virginia pine are preferred for Christmas trees.

Seedling mortality is moderate because of droughtiness. Plant competition is moderate for conifers and slight for hardwoods. Because of the steep slopes and the loose sandy surface layer, equipment limitations are severe.

The site index for loblolly pine ranges between 75 and 85, and the yearly maximum expected yield per acre at 50 years of age is about 470 board feet. Annual yields of about one cord per acre of Virginia pine pulpwood can be expected in stands of trees that are 30 years old.

WOODLAND SUITABILITY GROUP 3w13

This group is made up of nearly level and level soils of the Elkton, Othello, and Rutlege series. The Elkton and Othello series are poorly drained and have high available moisture capacity and low to moderate natural fertility. The Rutlege soils, however, are very poorly drained and have very low available moisture capacity and natural fertility.

The soils in this group are well suited to loblolly pine, sweetgum, red maple, and oaks. Loblolly pine and sweetgum are preferred for planting for wood crops, and white pine is preferred for planting for Christmas trees.

Seedling mortality, plant competition, and equipment limitations are severe because of wetness.

The site index for loblolly pine ranges between 75 and 85, and the yearly maximum expected yield per acre at 50 years of age is about 470 board feet.

WOODLAND SUITABILITY GROUP 6s21

In this group are the level to sloping Coastal beaches. These loose incoherent sands are subject to constant working by wind, tide, and waves. Ground water ranges from brackish to saline, and the water table is highly variable. Available moisture capacity and natural fertility are very low.

Coastal beaches are very poorly suited to trees, and many areas are barren of trees. The areas are not suitable for planting either native or commercial trees for wood crops or for Christmas trees.

Because of droughtiness, salinity, and the hazard of injury to seedlings by blowing sand, seedling mortality is severe. Plant competition is slight. Equipment limitations are severe because of the loose sand and its lack of cohesiveness.

Use of the Soils for Wildlife [3]

Wildlife is a valuable resource in Worcester County. About 23 percent of the land area is potentially good habitat for openland and woodland wildlife, and about 36 percent is potentially good habitat for wetland wildlife. Openland wildlife includes rabbit, deer, and quail, and woodland wildlife includes squirrel, deer, and turkey. Wetland wildlife includes raccoon, woodcock, muskrat, and waterfowl. It does not include marine life present in the larger rivers and their estuaries and in bays and ponds, which provide recreation for those who like to fish.

In addition to its land area, the county has about 175 miles of shoreline along the river and bays and 32 miles along the ocean that are important to wildlife. These areas are available to wildlife between normal high and low tides. They generally are narrow and continuous, and they include such areas as the mud flats along the Pocomoke River. At low tide they are important feeding grounds for some kinds of waterfowl and shore birds and for a number of animals, especially the raccoon. Any kind of pollution, such as that caused by insecticides and herbicides, damages these feeding grounds. Damage is also caused by shore erosion and by deposition of soil material washed from uplands. Material washed from uplands and marshes, however, supplies food that is used extensively by many kinds of aquatic life.

Table 3 lists the soils of the county and rates their suitability for eight elements of wildlife habitat and three classes, or kinds, of wildlife. Also, in this table the soils are given a rating of *good*, or above average; *fair*, or average; *poor*, or below average; and *not suited*.

ELEMENTS OF WILDLIFE HABITAT. The elements of wildlife habitat are discussed in the following paragraphs.

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[3] By THOMAS C. CREBBS, Jr., wildlife biologist, Soil Conservation Service.

TABLE 3.—*Suitability of the soils for elements*

[Not included in this table, because their characteristics are too variable

Soil series and map symbols	Elements of wildlife habitat			
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants
Coastal beaches: CbB, CbC	Not suited	Poor	Poor	Not suited
Elkton: Ek, El, Em	Poor	Fair	Fair	Good
Fallsington: Fa, Fg	Poor	Fair	Fair	Good
Fort Mott:				
FmA, FmB, FmC	Fair	Fair	Fair	Fair
FmC3, FmD	Poor	Poor	Fair	Fair
Klej:				
KsA	Poor	Fair	Fair	Fair
KsB	Poor	Fair	Fair	Fair
Lakeland:				
LaD, LkD, LkE	Not suited	Poor	Poor	Poor
LlB, LmB, LoB, LoC	Poor	Poor	Poor	Poor
(For suitability of Fort Mott soils in LoB and LoC, refer to units FmA through FmC in Fort Mott series in this table.)				
Leon: Ls	Not suited	Poor	Fair	Fair
Matapeake:				
MdA, MeA	Good	Good	Good	Good
MdB, MdC, MeB, MeC	Fair	Good	Good	Good
MkC3, MkD	Poor	Fair	Good	Good
MkE	Not suited	Poor	Good	Good
Mattapex:				
MoA, MpA, MtA	Fair	Good	Good	Good
MoB, MpB, MtB	Fair	Good	Good	Good
Mixed alluvial land: My	Not suited	Poor	Poor	Good
Muck: Mz	Not suited	Not suited	Not suited	Good
Othello: Ot	Poor	Fair	Fair	Good
Plummer: Pe	Not suited	Poor	Poor	Good
Pocomoke: Pk, Pm	Not suited	Poor	Poor	Good
Portsmouth: Pr, Pt	Not suited	Poor	Poor	Good
Rutlege: Ru	Not suited	Poor	Poor	Good
Sassafras:				
SaA, SmA	Good	Good	Good	Good
SaB2, SaC2, SmB2	Fair	Good	Good	Good
SaC3, SaD	Poor	Fair	Good	Good
SaE	Not suited	Poor	Good	Good
St. Johns: St, Su	Not suited	Poor	Poor	Good
Tidal marsh: Tm	Not suited	Not suited	Not suited	Not suited
Woodstown:				
WdA, WoA	Fair	Good	Good	Good
WdB, WoB	Fair	Good	Good	Good

of wildlife habitat and kinds of wildlife

to estimate, are the land types Gravel and borrow pits and Made land]

Elements of wildlife habitat—Continued				Kinds of wildlife		
Coniferous woody plants	Wetland food and cover plants	Shallow-water developments	Excavated ponds	Openland wildlife	Woodland	Wetland wildlife
Not suited	Not suited	Not suited	Not suited	Not suited	Not suited	Not suited.
Fair	Good	Good	Good	Fair	Good	Good.
Fair	Good	Good	Good	Fair	Good	Good.
Fair	Not suited	Not suited	Not suited	Fair	Fair	Not suited.
Fair	Not suited	Not suited	Not suited	Poor	Fair	Not suited.
Poor	Poor	Poor	Good	Fair	Poor	Fair.
Poor	Not suited	Not suited	Poor	Fair	Poor	Poor.
Good	Not suited	Not suited	Not suited	Not suited	Poor	Not suited.
Good	Not suited	Not suited	Not suited	Poor	Poor	Not suited.
Fair	Good	Poor	Good	Poor	Fair	Fair.
Poor	Not suited	Not suited	Not suited	Good	Good	Not suited.
Poor	Not suited	Not suited	Not suited	Good	Good	Not suited.
Poor	Not suited	Not suited	Not suited	Fair	Fair	Not suited.
Poor	Not suited	Not suited	Not suited	Poor	Fair	Not suited.
Poor	Poor	Poor	Poor	Good	Good	Poor.
Poor	Not suited	Not suited	Not suited	Good	Good	Not suited.
Good	Good	Fair	Fair	Poor	Good	Fair.
Not suited	Good	Good	Good	Not suited	Poor	Good.
Fair	Good	Good	Good	Fair	Good	Good.
Good	Good	Good	Good	Poor	Good	Good.
Good	Good	Good	Good	Poor	Good	Good.
Good	Good	Good	Good	Poor	Good	Good.
Good	Good	Good	Good	Poor	Good	Good.
Poor	Not suited	Not suited	Not suited	Good	Good	Not suited.
Poor	Not suited	Not suited	Not suited	Good	Good	Not suited.
Poor	Not suited	Not suited	Not suited	Fair	Fair	Not suited.
Poor	Not suited	Not suited	Not suited	Poor	Fair	Not suited.
Good	Good	Good	Good	Poor	Good	Good.
Not suited	Good	Poor	Not suited	Not suited	Not suited	Fair.
Poor	Poor	Poor	Poor	Good	Good	Poor.
Poor	Not suited	Not suited	Not suited	Good	Good	Not suited.

Grain and seed crops include corn, soybeans, sorghum, millet, buckwheat, wheat, cowpeas, oats, barley, rye, and other crops that produce grainlike seeds used by wildlife.

Grasses and legumes include lespedeza, alfalfa, alsike clover, Ladino clover, red clover, tall fescue, bromegrass, bluegrass, and timothy. All of these are commonly planted for forage, but they also are valuable for wildlife.

Wild herbaceous upland plants consist of native annual or other herbaceous plants that commonly grow in upland areas. Included are panicgrass and other native grasses, partridgepea, beggartick, lespedeza, and other native herbs that wildlife use for food and cover.

Hardwood woody plants are natural or planted trees, shrubs, and woody vines that grow vigorously and produce heavy crops of seed or other fruit. Among these plants are dogwood, sumac, sassafras, persimmon, hazlenut, multiflora rose, perennial lespedeza, wild cherry, autumn-olive, Tartarian honeysuckle, various kinds of oak and hickory, blueberry, bayberry, huckleberry, blackhaw, gums, and various kinds of holly.

Coniferous woody plants are coniferous trees and shrubs that are native or are planted. Examples are Virginia pine, loblolly pine, shortleaf pine, pond pine, and redcedar. The rating is based on whether young plants grow rapidly and develop dense foliage, not on the size of mature plants. A soil that is good for growing Christmas trees rates high.

Wetland food and cover plants are plants that provide food and cover for waterfowl and furbearing animals. Examples are wildrice, smartweed, bulrush, switchgrass, wild millet, pondweed, arrow-arum, pickerelweed, cattail, waterwillow, and various sedges.

Shallow water developments are impoundments in which shallow water can be maintained at a desired level. On soils suitable for these impoundments, the water can be controlled at a level ranging from the natural groundwater level to within 2 feet above it.

Excavated ponds are dug-out ponds that depend on ground water, not runoff. Some runoff is beneficial if it is not excessive and does not include too much silt. The level of water in the ponds normally fluctuates with the level of the natural ground water. Migrating fowl frequently are attracted to such ponds.

Farm ponds of the impounded type are not included in table 3, but they can be important in producing fish. If fish are to be produced, at least one-fifth of the pond should be 6 feet deep or more. Table 6 in the subsection "Engineering Uses of the Soils" gives features of each soil in the county that affect the selection of sites for ponds.

MANAGING TIDAL MARSH FOR WILDLIFE. Tidal marsh occupies 19,270 acres in Worcester County and provides resting areas for many waterfowl. Because the estuaries draining these areas are relatively high in salinity, the marshland is covered with plants that are tolerant of salt. In low areas where the water table is at the surface, the vegetation is a solid stand of needlerush and marshhay cordgrass (*Spartina patens*). In areas where the elevation is slightly higher or the water table is lower, the plant cover includes bigleaf swampweed and smooth cordgrass. The edges of Tidal marsh are commonly covered by dense stands of switchgrass.

Black duck, mallard, baldpate, and teal are the principal kinds of waterfowl in this habitat. The plants produce little food for these birds, and only part of the existing food is accessible. Creating areas of open water by diking or blasting results in greater use of the marshland in winter and during the nesting season. Stabilizing the water level improves the habitat for muskrats.

In the management of marshland, it is important that areas be kept free of pollution. The more salty areas can be freshened by digging holes or ponds, each a few feet in diameter, and connecting them by ditches that contain small water-control structures. Rainwater collected in the ponds is spread through the ditches to other parts of the marshes. Spreading fresh water in this manner helps to maintain the desirable plants and consequently brings about increased use of the areas by waterfowl and muskrats.

Certain marsh areas should not be drained because they are made up of material called cat clay. This material, which must be identified at the site, contains large amounts of sulfur compounds. If the excess water is removed, oxidation of these compounds results in the formation of sulfuric acid that kills vegetation and makes the affected areas practically worthless.

Engineering Uses of the Soils [4]

This subsection of the survey is a guide to the properties of the soils and the influence of those properties on problems related to engineering. Some of these properties are of special interest to engineers because they affect the construction and maintenance of roads, airports, pipelines, foundations for buildings, facilities for water storage, structures for erosion control, drainage systems, and sewage disposal systems. Among the properties most important to engineers are permeability, compaction characteritics, drainage, shrink-swell potential, grain size, plasticity, and reaction. Also of importance are relief, depth to the water table and to bedrock, and hazard of flooding.

The properties of the soils were estimated on the basis of information obtained by examining the soils closely in the field and evaluating their characteristics as they apply to engineering needs, and by testing samples taken from horizons of soils in selected series that are represented in Worcester County. Also considered were the results of tests made on samples of similar soils taken from Somerset and Wicomico Counties.

Information about the soils is made available in this subsection. It can be used by engineers to—

1. Make studies that will aid in selecting and developing sites for industries, businesses, residences, and recreational areas.
2. Make estimates of the engineering properties of soils for use in the planning of agricultural drainage systems, waterways, farm ponds, irrigation systems, terraces and diversions, and other structures for conserving soil and water.
3. Make preliminary evaluations of soil and ground conditions that will aid in selecting locations for highways, airports, pipelines, cables, and sewage disposal fields and in planning more detailed surveys at the selected locations.
4. Locate probable sources of sand, gravel, and other materials for use in construction.

[4] KENDALL P. JARVIS, State conservation engineer, Soil Conservation Service, assisted in preparing this subsection.

5. Correlate performance of engineering structures with the soil mapping units and thus develop information for overall planning that will be useful in designing and maintaining the structures.
6. Determine the suitability of the soils for cross-country movement of vehicles and of construction equipment.
7. Supplement information obtained from other published maps, reports, and aerial photographs for the purpose of making maps and reports that can be used readily by engineers.
8. Develop other preliminary estimates for design and construction purposes pertinent to the particular area.

Used with the soil map to identify the soils, the engineering interpretations in this subsection can be useful for many purposes. It should be emphasized that the interpretations do not eliminate the need for sampling and testing at the site of specific engineering works involving heavy loads or where excavations are deeper than the depths of layers here reported. Also, the soil mapping units shown on the detailed map in this survey may include small areas of different kinds of soil material. These included soils may be as large as 2 acres. They are too small to be mapped separately and generally are not significant to farming in the county but may be important in engineering. Nevertheless, even in these situations, the tables and the soil map are useful for planning more detailed field investigations and for suggesting the kinds of problems that can be expected.

The information in this subsection shows, for example, that the Fallsington soils have poor grading potential when wet and are not suitable for grading when frozen. Lakeland soils, on the other hand, are suitable for grading under similar conditions. Also, the information in this subsection shows that soils of the Sassafras series are suitable for use in constructing dikes, levees, and embankments. It does not show, however, how good the Sassafras soils are for these uses in any particular area. Such detailed information can be obtained only by tests made at the site considered.

Some of the terms used by the scientist may be unfamiliar to the engineer, and some words—for example, clay, sand, and silt—may have special meaning in soil science. These and other special terms used in the soil survey are defined in the Glossary at the back of this survey. Most of the information about engineering is given in tables 4, 5, and 6.

Engineering test data

Samples that represent 10 soil series were taken from 30 locations in Worcester County and were tested by the Bureau of Public Roads (BPR) according to standard procedures of the American Association of State Highway Officials (AASHO) (*1*). The data obtained from these tests are given in table 4.

Table 4 also gives the specific location of each soil sample, the depth at which the sampling was done, and the results of the subsequent tests. In addition it classifies the soil material of each sample according to the AASHO and Unified systems (*12*). These classifications are based on data obtained by mechanical analyses and by tests made to determine the liquid and plastic limits.

The tests for the liquid limit and the plastic limit measure the effect of water on consistence of the soil material. As the moisture content of a clayey soil increases from a dry state, the material changes from a semisolid to a plastic state. As the moisture content is further increased, the material changes from a plastic to a liquid state. The *plastic limit* is the moisture content at which the material changes from a semisolid to a plastic state. *Liquid limit* is the moisture content at which a soil passes from a plastic to a liquid state. The *plasticity index* is the numerical difference between liquid limit and plastic limit. It indicates the range of moisture content within which the soil material is in a plastic condition. Some loamy and sandy soils are nonplastic; that is, they do not become plastic at any moisture content.

Estimated engineering properties of the soils

Table 5 shows some estimated soil properties that are important in engineering and gives the estimated AASHO and Unified classification of the soils. The textural terms used to describe the soil material in the main horizons are those used by the U.S. Department of Agriculture. Color has been omitted from the table, but it is given in the section "Descriptions of the Soils." Also omitted is depth to bedrock, because all the soils in Worcester County are underlain by unconsolidated sediment that extends to great depth.

The information given in table 5 applies to soils that are only slightly eroded. Also, the thickness of the soil horizons varies somewhat from place to place, but the thickness and other properties described in the table are those that actually exist in a representative profile; they are not averages obtained from a number of profiles.

Depth to a seasonal high water table refers to the highest level at which the ground water stands for a significant period of time.

In table 5 range in permeability is estimated in terms of the rate that water moves downward through an undisturbed saturated soil. Soil material is not under hydrostatic pressure in these estimates, and no water table or other restriction is present.

The available moisture capacity is the capacity of the soil to hold moisture available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is expressed in table 5 as inches of water per inch of soil.

The range in reaction, given as pH values, indicates the degree of acidity of the soil horizon.

Optimum moisture is the moisture content at which the soil can be compacted to a maximum dry density.

Maximum dry density is the greatest amount of dry soil, by weight, that can be compacted into a given unit of volume, under controlled conditions and by standard procedures. In table 5 it is expressed as pounds of soil per cubic foot.

Shrink-swell potential indicates the volume change that can be expected with a change in moisture content. Estimates are based primarily on the kind and amount of clay in a horizon.

Corrosion potential refers to the deterioration of concrete or untreated steel pipelines as a result of exposure to oxygen and moisture and to chemical and electrolytic reactions.

TABLE 4.—*Engineering*

[Tests performed by the Bureau of Public Roads (BPR) in accordance with standard

Soil name and location	BPR report No. S-76	Depth	Mechanical analyses [1] Percentage passing sieve— No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)
		Inches			
Coastal beaches:					
1.8 miles south of Delaware line, on east side of Coastal Highway and Vandover Street.	701	0–40	100	89	1
2.6 miles south of Delaware line on west side of Coastal Highway	702	0–21	100	53	5
	703	24–50	[5] 97	78	1
500 feet east of shoreline on southeast corner of parking lot, Assateague Island State Park.	704	0–30	100	87	1
Fallingston sandy loam:					
0.9 mile southeast of Spence on south side of Public Landing Road. (Modal profile)	705	3–12	100	92	32
	706	12–20	100	79	25
	707	28–34	100	77	14
0.3 mile south of McGrath Road on east side of Meadow Bridge Road. (More poorly drained than modal)	708	3–14	100	86	24
	709	19–27	100	84	26
	710	27–44	100	82	23
2.5 miles southeast of Snow Hill on south side of Brick Kiln Road. (Coarser textured than modal)	711	0–8	100	93	25
	712	12–22	100	93	39
	713	26–48	100	87	17
Lakeland loamy sand:					
On north side of intersection of Forest Lane and Voting House Road. (Modal profile)	714	0–10	100	84	6
	715	10–32	100	89	10
	716	40–52	100	93	3
Lakeland sand:					
0.25 mile west of U.S. Highway 113 and 0.5 mile south of Hardship Branch. (Wet in substratum)	717	2–9	100	73	5
	718	21–45	100	72	4
1.5 miles west of Maryland State Route 12 on north side of Old Furnace Road. (Modal profile)	719	0–7	100	88	3
	720	12–126	100	90	5
Matapeake silt loam:					
1 mile north of Maryland State Route 12 on east side of Snow Hill-Whiton Road. (Modal profile)	721	0–9	100	97	82
	722	14–26	100	99	95
	723	48–65	100	89	14
South corner of intersection of Maryland State Route 12 and Nassawango Road. (Thin silt solum)	724	0–9	100	90	55
	725	15–28	100	93	71
	726	44–62	100	84	28
Matapeake fine sandy loam:					
0.5 mile south of Ocean Downs Road on U.S. Highway 113. (Modal profile)	727	2–12	100	96	59
	728	20–36	100	96	67
	729	52–88	100	93	26
Mattapex loam:					
1,000 feet west of Snow Hill-Whiton Road and 3.5 miles north of Snow Hill. (Modal profile)	730	0–9	100	97	68
	731	29–39	100	98	83
	732	46–55	100	88	35
800 feet northeast of Maryland State Route 12 on northwest side of Snow Hill-Whiton Road. (Contains more gravel than modal)	733	0–9	100	87	59
	734	20–27	[5] 96	84	58
	735	34–48	100	76	20

See footnotes at end of table.

test data

procedures of the American Association of State Highway Officials (AASHO) (*1*)]

Mechanical analyses [1]—Continued				Liquid limit	Plasticity index	Classification	
Percentage smaller than—						AASHO [2]	Unified [3]
0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
				Percent			
1	1	1	1	[4] NP	[4] NP	A-3(0)	SP
3	2	2	2	NP	NP	A-3(0)	SP-SM
1	1	1	1	NP	NP	A-3(0)	SP
1	1	1	1	NP	NP	A-3(0)	SP
31	25	17	12	NP	NP	A-2-4(0)	SM
22	20	17	13	NP	NP	A-2-4(0)	SM
13	11	9	7	NP	NP	A-2-4(0)	SM
23	20	14	10	20	3	A-2-4(0)	SM
25	24	21	17	18	4	A-2-4 0)	SM
22	19	15	12	17	2	A-2-4(0)	SM
23	16	8	6	NP	NP	A-2-4(0)	SM
38	32	18	13	15	3	A-4(1)	SM
15	12	9	8	NP	NP	A-2-4(0)	SM
5	5	5	4	NP	NP	A-3(0)	SP-SM
9	9	9	8	NP	NP	A-3(0)	SP-SM
2	2	2	2	NP	NP	A-3(0)	SP
5	5	5	5	NP	NP	A-3(0)	SP-SM
4	4	4	4	NP	NP	A-3(0)	SP
3	3	3	3	NP	NP	A-3(0)	SP
5	5	5	5	NP	NP	A-3(0)	SP-SM
80	62	30	19	28	6	A-4(8)	ML-CL
93	69	38	29	32	11	A-6(8)	ML-CL
14	14	13	11	NP	NP	A-2-4(0)	SM
53	37	18	11	20	3	A-4(4)	ML
70	58	33	26	27	10	A-4(7)	CL
27	23	18	14	NP	NP	A-2-4(0)	SM
58	45	23	15	24	5	A-4(5)	ML-CL
66	57	38	30	32	13	A-6(7)	CL
25	21	15	14	NP	NP	A-2-4(0)	SM
65	48	25	17	21	4	A-4(7)	ML-CL
81	59	29	22	28	9	A-4(8)	CL
34	28	20	16	21	7	A-2-4(0)	SM-SC
57	45	26	18	24	7	A-4(5)	ML-CL
56	46	26	20	26	10	A-4(5)	CL
19	17	15	13	NP	NP	A-2-4(0)	SM

TABLE 4.—*Engineering*

Soil name and location	BPR report No. S-76	Depth	Mechanical analyses[1] Percentage passing sieve— No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)
		Inches			
Mattapex silt loam:					
0.4 mile west of Evans Road on north side of Cedar Lane. (Thin silty solum)	736	0–8	100	99	85
	737	8–23	------------	100	95
	738	40–50	100	96	18
Othello silt loam:					
0.5 mile east of Libertytown on north side of Ironshire Station Road. (Modal profile)	739	0–8	------------	100	96
	740	14–27	------------	------------	98
	741	33–55	100	84	20
1.5 miles west of Evans Road on south side of Cedar Lane. (Deep solum)	742	1–8	------------	100	95
	743	8–20	------------	------------	99
	744	40–65	100	98	29
0.5 mile southwest of Camp Road on south side of River Road. (Thin solum)	745	1–6	100	97	74
	746	12–28	100	98	78
	747	28–40	100	93	21
Pocomoke sandy loam:					
1,200 feet east of Meadow Bridge Road on side of McGrath Road. (Modal profile)	757	0–11	100	88	42
	758	20–33	100	82	33
	759	33–60	100	78	24
2.5 miles southeast of Snow Hill on north side of Brick Kiln Road. (High clay content)	748	0–14	100	94	54
	749	20–29	100	95	62
	750	40–53	100	87	7
Portsmouth sandy loam:					
0.8 mile southeast of Halfway Station Road on south side of Maryland State Route 12. (Modal profile)	751	0–10	100	89	32
	752	16–31	100	89	44
	753	31–65	100	82	11
2.3 miles north of Whiteburg on south side of Honeywell Road. (Thin solum)	754	0–9	100	91	20
	755	14–23	100	91	26
	756	29–62	100	96	5
Portsmouth silt loam:					
0.6 mile south of Cedartown Road on east side of Double Bridge Road. (Modal profile)	763	0–12	100	97	75
	764	15–22	100	98	84
	765	31–44	100	86	16
0.25 mile south of Cedar Lane on west side of Evans Road. (Light-textured subsoil)	760	0–8	------------	100	92
	761	18–28	------------	100	90
	762	49–80	100	99	15
Sassafras sandy loam:					
0.4 mile north of U.S. Highway 113 on west side of Blades Road. (Modal profile)	766	1–8	100	87	23
	767	16–29	100	88	31
	768	34–41	100	87	13
0.5 mile southwest of Corbin on northeast side of Oak Hall Road. (Loamy subsoil)	769	2–13	100	88	46
	770	13–25	100	86	53
	771	31–50	100	88	22
0.5 mile southeast of U.S. Highway 113 on southwest side of Castle Hill Road. (Thin solum)	772	1–12	100	90	36
	773	17–28	100	89	38
	774	34–50	100	76	10

See footnotes at end of table.

test data—Continued

Mechanical analyses [1]—Continued				Liquid limit	Plasticity index	Classification	
Percentage smaller than—						AASHO [2]	Unified [3]
0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
				Percent			
82	62	33	24	26	7	A-4(8)	ML-CL
93	68	34	27	34	12	A-6(9)	ML-CL
17	16	15	11	NP	NP	A-2-4(0)	SM
90	58	20	13	24	2	A-4(8)	ML
95	66	39	33	40	19	A-6(12)	CL
19	15	9	6	NP	NP	A-2-4(0)	SM
91	58	22	15	22	3	A-4(8)	ML
95	63	33	28	32	14	A-6(10)	CL
26	22	18	14	NP	NP	A-2-4(0)	SM
72	48	17	9	21	1	A-4(8)	ML
76	63	34	27	32	14	A-6(10)	CL
20	17	12	7	NP	NP	A-2-4(0)	SM
39	34	23	17	26	4	A-4(1)	SM-SC
30	22	18	13	25	11	A-2-6(0)	SC
21	18	15	13	22	8	A-2-4(0)	SC
51	42	26	18	30	6	A-4(4)	ML-CL
56	35	23	19	20	5	A-4(5)	ML-CL
6	5	5	4	NP	NP	A-3(0)	SP-SM
30	26	19	13	33	5	A-2-4(0)	SM
41	39	34	30	29	12	A-6(2)	SC
10	9	8	6	NP	NP	A-2-4(0)	SP-SM
19	16	12	9	NP	NP	A-2-4(0)	SM
25	23	20	16	18	2	A-2-4(0)	SM
4	4	4	3	NP	NP	A-3(0)	SP-SM
73	59	39	30	50	12	A-7-5(11)	ML
80	56	30	22	32	13	A-6(9)	CL
15	10	3	1	NP	NP	A-2-4(0)	SM
89	65	34	19	39	9	A-4(8)	ML
87	60	28	17	27	7	A-4(8)	ML-CL
14	10	4	2	NP	NP	A-2-4(0)	SM
21	18	11	5	NP	NP	A-2-4(0)	SM
30	26	22	18	21	5	A-2-4(0)	SM-SC
10	9	8	7	NP	NP	A-2-4(0)	SM
45	36	17	11	17	1	A-4(2)	SM
52	42	28	21	25	9	A-4(4)	CL
21	20	19	18	NP	NP	A-2-4(0)	SM
32	26	17	12	17	2	A-4(0)	SM
36	32	22	15	21	6	A-4(1)	SM-SC
9	8	8	7	NP	NP	A-3(0)	SP-SM

TABLE 4.—*Engineering*

Soil name and location	BPR report No. S-76	Depth	Mechanical analyses[1] Percentage passing sieve— No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)
		Inches			
Woodstown sandy loam:					
1.5 miles southeast of Snow Hill on northeast side of Brick Kiln Road. (Modal profile)	775	0–8	100	92	31
	776	12–22	100	92	41
	777	30–45	100	85	23
0.4 mile southeast of U.S. Highway 113 on southwest side of Castle Hill Road. (Finer textured)	778	2–15	100	90	37
	779	20–27	100	88	39
	780	43–68	100	76	11
0.5 mile west of Snow Hill-Wilton Road on north side of Davis Road. (Thin solum)	781	0–9	100	92	44
	782	9–18	100	95	53
	783	23–34	100	99	36

[1] Mechanical analyses according to the AASHO Designation T 88. Results by this procedure frequently may differ from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes for soil.

TABLE 5.—*Estimated engineering*

[Not included in this table because their properties are too variable to be classified are Muck (Mz), and the land types Gravel and borrow it would not be applicable. >=greater; <=less than. An asterisk in the first column indicates that at least one mapping unit in this this reason it is necessary to follow carefully the instructions for referring to other series that appear in the first column of this table]

Soil name and map symbols	Depth to seasonal high water table	Depth from surface	Classification: Dominant USDA texture	Unified	AASHO
	Feet	*Inches*			
Coastal beaches: CbB, CbC	3–10	0–60	Sand	SP or SP–SM	A–3
Elkton: Ek, El, Em	0	0–14	Silt loam, loam, or sandy loam to light silty clay.	SM, ML, or CL	A–4 or A–6
		14–27	Silty clay	CL or CH	A–4, A–6, A–7
		27–60	Sandy clay loam and sandy loam	SC, ML, or CL	A–4 or A–6
Fallsington: Fa, Fg	0	0–12	Sandy loam or loam	SM, ML, or SM–SC	A–2 or A–4
		12–28	Sandy clay loam or sandy loam	SM, SC, or ML	A–2, A–4, or A–6
		28–55	Loamy sand to sandy loam	SP, SM, or SC	A–2 or A–3
Fort Mott: FmA, FmB, FmC, FmC3, FmD.	5+	0–24	Loamy sand	SM	A–2
		24–37	Sandy loam	SM or SC	A–2 or A–4
		37–50	Loamy sand	SP or SP–SM	A–2 or A–3
Klej: KsA, KsB	1–2½	0–60	Loamy sand	SP or SP–SM	A–2 or A–3

See footnotes at end of table.

test data—Continued

Mechanical analyses [1]—Continued				Liquid limit	Plasticity index	Classification	
Percentage smaller than—						AASHO [2]	Unified [3]
0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
				Percent			
29	23	12	7	NP	NP	A-2-4(0)	SM
38	32	24	18	16	4	A-4(1)	SM-SC
22	22	21	18	NP	NP	A-2-4(0)	SM
35	28	19	14	NP	NP	A-4(0)	SM
36	32	23	17	18	4	A-4(1)	SM-SC
9	9	9	9	NP	NP	A-2-4(0)	SP-SM
42	35	20	14	18	3	A-4(2)	SM
50	42	23	18	16	2	A-4(4)	ML
31	29	25	22	19	1	A-4(0)	SM

[2] Based on AASHO Designation M 145-49.
[3] SCS and BPR have agreed to consider that all soils having plasticity indexes within 2 points from A-line are to be given a borderline classification. Examples of borderline classification obtained by this use are ML-CL, SP-SM, and SM-SC.
[4] NP = Nonplastic.
[5] 100 percent of the soil material passed a ⅜-inch sieve.

properties of the soils

pits (Gb), Made land (Ma), and Mixed alluvial land (My). Absence of information indicates the determination was not made or that series is made up of two or more kinds of soil. The soils in such mapping units may have different properties and limitations, and for

Percentage passing sieve [1]—			Range in permeability	Range in available moisture capacity	Range in reaction [2]	Optimum moisture	Maximum dry density	Shrink-swell potential	Corrosion potential	
No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)							Untreated steel	Concrete
			Inches per hour	*Inches per inch of depth*	*pH*	*Percent*	*Lbs. per cu. ft.*			
95-100	50-90	0-5	>6.3	<0.06	5.0-8.0	9-15	91-110	Low	High	High.
95-100	90-100	35-90	0.2-2.0	0.12-0.27	4.5-5.0			Low or moderate	High	High.
95-100	90-100	65-100	<0.2	0.18-0.24	4.0-5.0	16-24	101-110	Moderate	High	High.
90-100	80-100	35-90	0.2-0.63	0.12-0.24	4.0-5.0	10-20	101-125	Low or moderate	High	High.
95-100	75-95	20-55	2.0-6.3	0.02-0.18	4.0-5.0			Low	High	High.
95-100	75-95	25-55	0.63-2.0	0.18-0.24	4.0-5.0	10-14	111-125	Low	High	High.
95-100	75-95	10-35	0.63-6.3	0.06-0.10	4.0-5.0	10-14	101-125	Low	High	High.
95-100	50-85	15-25	2.0-6.3	0.06-0.08	4.0-5.0	10-15	101-110	Low	Low	High.
95-100	65-90	25-40	0.63-2.0	0.12-0.18	4.0-5.0	7-18	111-125	Low	Low	High.
95-100	30-60	0-15	>6.3	<0.06	4.0-5.0	8-12	91-110	Low	Low	High.
95-100	50-80	5-15	>6.3	0.06-0.08	4.0-5.0	8-12	101-110	Low	Moderate	High.

TABLE 5.—*Estimated engineering*

Soil name and map symbols	Depth to seasonal high water table	Depth from surface	Classification		
			Dominant USDA texture	Unified	AASHO
	Feet	*Inches*			
*Lakeland:					
LaD, LkD, LkE	10+	0–72	Loamy sand to sand	SP, SP–SM or SM	A–2 or A–3
LlB LmB, LoB, LoC. For properties of Fort Mott soils in mapping units LoB and LoC, refer to the Fort Mott series in this table.	5+	0–66	Loamy sand to sand	SP, SP–SM or SM	A–2 or A–3
		66–80	Sandy loam to sandy clay loam	SM	A–2
Leon: Ls	½–1½	0–17	Loamy sand	SM or SP–SM	A–2 or A–3
		17–38	Loamy sand	SP–SM	A–3
		38–70	Loamy sand to fine sand	SP	A–3
Matapeake: MdA, MdB, MdC, MeA, MeB, MeC, MkC3, MkD, MkE.	5+	0–14	Fine sandy loam or silt loam	ML or ML–CL	A–4
		14–33	Silty clay loam to clay loam	CL or ML–CL	A–4 or A–6
		33–48	Sandy clay loam to sandy loam	SM or SP–SM	A–2
		48–65	Loamy sand	SP, SP–SM or SM	A–2 or A–3
Mattapex: MoA, MoB, MpA, MpB, MtA, MtB.	1½–2½	0–16	Fine sandy loam, loam, or silt loam.	ML or ML–CL	A–4
		16–39	Silty clay loam	CL or ML–CL	A–4 or A–6
		39–55	Sandy clay loam to sandy loam	SP–SM, SM or SM–SC	A–2, A–3
Othello: Ot	0	0–9	Silt loam	ML or ML–CL	A–4
		9–25	Silty clay loam	CL or ML–CL	A–4 or A–6
		25–31	Sandy clay loam	SM	A–2
		31–42	Loamy sand	SP–SM or SM	A–2 or A–3
Plummer: Pe	0	0–54	Loamy sand to sand	SP or SP–SM	A–2 or A–3
Pocomoke: Pk, Pm	0	0–20	Sandy loam or loam	SM, ML, or ML–CL	A–2 or A–4
		20–34	Sandy loam to sandy clay loam	SM, SC or ML–CL	A–2, A–4, or A–6
		34–40	Sandy loam	SP–SM or SM	A–2 or A–3
		40–53	Sand	SP or SP–SM	A–3 or A–2
Portsmouth: Pr, Pt	0	0–12	Sandy loam or silt loam	SM–SC or ML	A–4 or A–7
		12–35	Silt loam or silty clay loam	SC, CL or ML–CL	A–2, A–4, or A–6
		35–80	Sandy loam to sand	SM or SC	A–2
Rutlege: Ru	0	0–21	Loamy sand	SP–SM	A–2 or A–3
		21–51	Sand or loamy sand	SP or SP–SM	A–3
Sassafras: SaA, SaB2, SaC2, SaC3, SaD, SaE, SmA, SmB2.	5+	0–13	Sandy loam or loam	SM or ML	A–2 or A–4
		13–33	Sandy clay loam	SM–SC, SC or CL	A–2 or A–4
		33–50	Loamy sand	SP–SM or SM	A–2 or A–3
St. Johns: St, Su	0	0–17	Loamy sand or mucky loamy sand.	SM or SP–SM	A–2 or A–3
		17–28	Loamy sand to sand or fine sand [3]	SP–SM	A–3
		28–68	Sand	SP	A–3
		68–72	Sandy clay loam or sandy clay	SM–SC, SC or CL	A–2, A–4, or A–6

See footnotes at end of table.

properties of the soils—Continued

Percentage passing sieve [1]—			Range in permeability	Range in available moisture capacity	Range in reaction [2]	Optimum moisture	Maximum dry density	Shrink-swell potential	Corrosion potential	
No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)							Untreated steel	Concrete
			Inches per hour	*Inches per inch of depth*	*pH*	*Percent*	*Lbs. per cu. ft.*			
95–100	70–95	0–20	>6. 3	0. 06–0. 08	4. 0–5. 0	10–14	101–115	Low	Low	High.
95–100	70–95	0–20	6. 3	0. 06–0. 08	4. 0–5. 0	10–14	101–115	Low	Low	High.
95–100	75–95	15–35	0. 2–2. 0	0. 12–0. 18	4. 0–5. 0	10–14	111–125	Low	Low	High.
95–100	75–95	5–15	>6. 3	0. 06–0. 08	3. 5–4. 5	10–14	101–110	Low	High	High.
95–100	60–85	5–10	0. 63–6. 3	<0. 06	3. 5–4. 5	10–14	101–115	Low	High	High.
95–100	60–85	0–5	>6. 3	<0. 06	3. 5–4. 5	8–12	95–110	Low	High	High.
95–100	90–100	50–90	0. 63–2. 0	0. 18–0. 27	4. 5–5. 0			Low	Low	Moderate.
95–100	90–100	60–95	0. 63–2. 0	0. 18–0. 24	4. 5–5. 0	12–18	101–120	Low or moderate	Moderate	Moderate.
95–100	80–100	10–35	0. 63–6. 3	0. 10–0. 18	4. 5–5. 0	10–15	111–125	Low	Low	High.
85–100	60–95	0–30	>6. 3	<0. 06	4. 0–5. 0	8–12	91–110	Low	Low	High.
95–100	85–100	55–90	0. 2–2. 0	0. 18–0. 27	4. 5–5. 5			Low	Moderate	Moderate.
95–100	80–100	55–100	0. 2–0. 63	0. 18–0. 24	4. 5–5. 5	12–18	101–120	Low or moderate	High	High.
95–100	75–100	10–35	0. 63–6. 3	0. 06–0. 18	4. 0–5. 0	10–15	111–125	Low	High	High.
95–100	70–100	60–100	0. 2–2. 0	0. 18–0. 27	4. 0–5. 0			Low	High	High.
95–100	80–100	70–100	0. 2–0. 63	0. 18–0. 24	4. 0–5. 0	12–18	111–120	Low or moderate.	High	High.
85–100	80–100	15–35	0. 63–2. 0	0. 12–0. 18	4. 0–5. 0	10–14	111–125	Low	High	High.
55–100	50–100	5–15	0. 63–6. 3	0. 06–0. 12	4. 0–5. 0	10–15	101–110	Low	High	High.
95–100	60–90	0–15	>6. 3	<0. 06	4. 0–5. 0	8–12	91–110	Low	High	High.
95–100	70–95	20–55	0. 63–2. 0	0. 12–0. 24	4. 0–5. 0			Low	High	High.
95–100	70–95	25–70	0. 63–2. 0	0. 12–0. 18	4. 0–5. 0	7–12	111–125	Low	High	High.
95–100	70–95	10–25	2. 0–6. 3	0. 06–0. 12	4. 0–5. 0	10–15	101–120	Low	High	High.
95–100	70–100	5–10	>2. 0	<0. 06	4. 0–5. 0	8–12	91–110	Low	High	High.
95–100	80–100	40–95	0. 2–2. 0	0. 18–0. 24	4. 0–5. 0			Low	High	High.
95–100	80–100	30–95	0. 63–2. 0	0. 18–0. 24	4. 0–5. 0	12–18	101–110	Low or moderate.	High	High.
95–100	75–100	15–25	2. 0–6. 3	0. 06–0. 12	4. 0–5. 0	10–15	101–120	Low	High	High.
95–100	60–90	10–15	2. 0–6. 3	0. 06–0. 12	3. 5–4. 5	10–14	101–110	Low	High	High.
95–100	60–90	0–10	>6. 3	<0. 06	3. 5–4. 5	8–12	91–110	Low	High	High.
95–100	85–100	20–60	2. 0–6. 3	0. 12–0. 18	4. 0–5. 0			Low	Low	High.
95–100	85–100	30–55	0. 63–2. 0	0. 18–0. 24	4. 0–5. 0	7–18	111–125	Low	Low	High.
95–100	70–95	10–25	2. 0–6. 3	<0. 06	4. 0–5. 0	9–15	101–125	Low	Low	High.
95–100	80–100	5–15	2. 0–6. 3	0. 06–0. 1	3. 5–4. 5	10–14	101–110	Low	High	High.
95–100	80–100	5–10	0. 63–2. 0	0. 06–0. 08	3. 5–4. 5	10–14	101–115	Low	High	High.
95–100	60–90	0–5	>6. 3	<0. 06	3. 5–4. 5	8–12	95–110	Low	High	High.
95–100	80–100	35–80	0. 2–2. 0	0. 12–0. 24	3. 5–4. 5	7–18	111–125	Low or moderate.	High	High.

TABLE 5.—*Estimated engineering*

Soil name and map symbols	Depth to seasonal high water table	Depth from surface	Classification		
			Dominant USDA texture	Unified	AASHO
	Feet	*Inches*			
Tidal marsh: Tm	0	0–60	(4)	(4)	(4)
Woodstown: WdA, WdB, WoA, WoB.	1½–2½	0–12	Sandy loam or loam	SM or ML	A–2 or A–4
		12–30	Sandy clay loam to sandy loam	SM–SC, ML or CL	A–4 or A–6
		30–64	Sandy loam	SM, SC, SP–SM or SM–SC	A–2 or A–4
		64–75	Loamy sand	SM or SP–SM	A–2

[1] 95 to 100 percent of material passed No. 4 sieve, except in the 31 to 42 inch layer of Othello where 85 to 100 percent of the material passed the No. 4 sieve.
[2] The reaction given is for unlimed soils; where soils have been limed the pH is higher.

TABLE 6.—*Engineering*

[Not included in this table because their properties are too variable to be interpreted are the land types Gravel and borrow pits (Gb) and of soil. The soils in such mapping units may have different properties and limitations, and for this reason it is necessary

Soil series and map symbols	Suitability for earthwork when soil is—		Susceptibility to frost action—	Suitability as source of—			Soil features that affect engineering practices for—	
	Wet	Frozen		Topsoil [1]	Sand or gravel	Road fill	Pipeline location [2]	Highway location [3]
Coastal beaches: CbB, CbC.	Good	Good	None to slight.	Not suitable.	Good for sand.	Poor	Poor stability; fluctuating saline water table.	Poor stability; fluctuating saline water table; hazard of wave action.
Elkton: Ek, El, Em.	Poor	Not suitable.	Severe	Poor	Not suitable.	Poor	Water table at or near surface; poor stability.	Water table at or near surface; poor stability; severe frost action.
Fallsington: Fa, Fg.	Fair	Poor	Severe	Fair to good.	Fair in substratum for sand.	Fair to good.	Water table at or near subface; fair to good stability.	Water table at or near surface; fair to good stability; severe frost action.
Fort Mott: FmA, FmB, FmC, FmC3, FmD.	Good	Fair	Slight	Fair	Good in substratum for sand.	Poor to good.	Seasonal water table at depth of more than 5 feet; fair stability.	Fair stability; slight frost action.

See footnotes at end of table.

properties of the soils—Continued

Percentage passing sieve [1]— No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	Range in permeability	Range in available moisture capacity	Range in reaction [2]	Optimum moisture	Maximum dry density	Shrink-swell potential	Corrosion potential — Untreated steel	Concrete
			Inches per hour	*Inches per inch of depth*	*pH*	*Percent*	*Lbs. per cu. ft.*			
(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	High	High.
95–100	75–95	30–65	0. 63–2. 0	0. 12–0. 24	4. 0–5. 0			Low	Low	High.
95–100	75–100	35–65	0. 63–2. 0	0. 12–0. 24	4. 0–5. 0	7–18	111–125	Low	Moderate	High.
95–100	75–95	10–45	0. 63–2. 0	0. 12–0. 18	4. 0–5. 0	7–18	111–125	Low	Moderate	High.
95–100	40–70	10–35	2. 0–6. 3	0. 06–0. 08	4. 0–5. 0	9–15	101–120	Low	Moderate	High.

[3] Discontinuous hardpan in B horizon.
[4] Variable.

interpretations

Made land (Ma). An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds to follow carefully the instructions for referring to other series that appear in the first column of this table]

Soil features that affect engineering practices for—Continued: Sites for ponds or reservoirs	Dikes, levees, and other embankments [4]	Drainage systems	Irrigation	Terraces or diversions	Waterways
Excessive seepage; fluctuating saline water table.	High porosity; single grain, loose material; subject to soil blowing and to wave action.	Excessively drained	Very low available moisture capacity; very rapid infiltration; excessively drained.	Poor stability; highly erodible by soil blowing and wave action.	Very low available moisture capacity and fertility.
Low seepage; high fluctuating water table.	Poor stability; Ek moderately erodible, El and Em highly erodible; very low porosity if compacted.	Slow to very slow permeability; Ek moderately erodible, El and Em highly erodible.	High available moisture capacity; poor natural drainage. Ek moderate infiltration, El and Em slow infiltration.	Poor stability; Ek moderately erodible, El and Em highly erodible.	High available moisture capacity; low natural fertility.
Moderate seepage in subsoil; high seepage in substratum; high fluctuating water table.	Fair to good stability; moderately erodible; low porosity if compacted.	Moderate permeability; moderately erodible.	High available moisture capacity; moderate to rapid infiltration; poor natural drainage.	Moderately erodible; fair to good stability.	High available moisture capacity; moderate fertility.
Moderate seepage in subsoil; high seepage in substratum; water table at a depth of more than 5 feet.	Fair stability; low to medium porosity if compacted.	Well drained	Low available moisture capacity; rapid infiltration; well drained.	Fair stability	Low available moisture capacity and fertility.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability for earthwork when soil is—		Susceptibility to frost action—	Suitability as source of—			Soil features that affect engineering practices for—	
	Wet	Frozen		Topsoil [1]	Sand or gravel	Road fill	Pipeline location [2]	Highway location [3]
Klej: KsA, KsB	Good	Fair	Moderate	Fair	Fair in surface layer for sand; fair in substratum for gravel.	Poor to fair.	Seasonal water table at depth of 1 to 2½ feet; fair stability.	Seasonal water table at depth of 1 to 2½ feet; fair stability; moderate frost action.
*Lakeland: LaD, LkD, LkE	Good	Good	None to slight.	Poor to fair.	Good for sand.	Fair	Seasonal water table at depth of more than 10 feet; fair stability.	Fair stability; loose material; slight frost action.
LlB, LmB, LoB, LoC. (For interpretations of Fort Mott soils in mapping units LoB and LoC, refer to the Fort Mott series in this table.)	Good	Good	None to slight.	Poor to fair.	Good for sand.	Fair	Seasonal water table at depth of more than 5 feet; fair stability.	Fair stability; loose material; slight frost action.
Leon: Ls	Good	Fair	Severe	Poor	Fair in surface layer for sand.	Poor	Seasonal water table at depth of ½ to 1½ feet; poor stability.	Seasonal water table at depth of ½ to 1½ feet; poor stability; severe frost action.
Matapeake: MdA, MdB, MdC, MeA, MeB, MeC, MkC3, MkD, MkE.	Poor	Poor	Moderate	Good	Fair in substratum for sand and gravel.	Fair to good.	Water table at depth of more than 5 feet; fair to good stability.	Fair to good stability; moderate frost action.
Mattapex: MoA, MoB, MpA, MpB, MtA, MtB.	Poor	Poor	Severe	Good	Fair in substratum for sand and gravel.	Fair	Water table at depth of 1 to 2½ feet; fair stability.	Water table at depth of 1 to 2½ feet; fair stability; severe frost action.
Mixed alluvial land: My.	Generally not suitable.	Generally not suitable.	Severe	Variable	Variable	Variable	Water table at depth of 0 to 2 feet; variable stability; flood hazard.	Water table at depth of 0 to 2 feet; variable stability; severe frost action; flood hazard.

See footnotes at end of table.

interpretations—Continued

Soil features that affect engineering practices for—Continued					
Sites for ponds or reservoirs	Dikes, levees, and other embankments [4]	Drainage systems	Irrigation	Terraces or diversions	Waterways
High seepage; moderately high fluctuating water table.	Fair stability; high porosity.	Rapid permeability; hazard of ditchbank caving.	Low available moisture capacity; moderately rapid infiltration; impeded natural drainage.	Fair stability	Low available moisture capacity and fertility.
High to excessive seepage; water table at a depth of more than 10 feet.	Fair stability; high porosity.	Excessively drained	Very low available moisture capacity; rapid infiltration; excessively drained.	Fair stability	Very low available moisture capacity and fertility.
High to excessive seepage; water table at a depth of more than 5 feet.	Fair stability; high porosity to depth of substratum.	Excessively drained	Very low available moisture capacity; rapid infiltration; excessively drained.	Fair stability	Very low available moisture capacity; low fertility
High to very high seepage; high fluctuating water table.	Poor stability; high porosity.	Moderate to moderately rapid permeability; hazard of ditchbank caving.	Very low available moisture capacity; rapid infiltration; somewhat poorly drained.	Poor stability	Very low available moisture capacity; low fertility.
Moderately low seepage in subsoil; high seepage in substratum; water table at depth of more than 5 feet.	Fair to good stability; moderately erodible; low to medium porosity if compacted.	Well drained	High available moisture capacity; moderate infiltration; well drained.	Moderately erodible; fair to good stability.	High available moisture capacity; moderate fertility.
Low seepage in subsoil; high seepage in substratum; moderately high fluctuating water table.	Fair stability; highly erodible; low to medium porosity if compacted.	Moderately slow permeability; highly erodible.	High available moisture capacity; moderate infiltration; impeded drainage.	Highly erodible; fair stability.	High available moisture capacity; moderate fertility.
Variable seepage; constant source of water; high to moderately high fluctuating water table.	Variable stability, erodibility, and porosity.	Variable permeability and erodibility.	Variable available moisture capacity and infiltration; generally very poorly drained.	Variable erodibility and stability.	Variable available moisture capacity and fertility.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability for earthwork when soil is—		Susceptibility to frost action—	Suitability as source of—			Soil features that affect engineering practices for—	
	Wet	Frozen		Topsoil [1]	Sand or gravel	Road fill	Pipeline location [2]	Highway location [3]
Muck: Mz	Poor	Not suitable.	Severe	Good [5]	Fair in substratum for sand.	Fair in substratum.	Water table at or near surface; hazard of ponding; unstable; flood hazard.	Water table at or near surface; hazard of ponding; unstable; severe frost action; flood hazard.
Othello: Ot	Poor	Not suitable.	Severe	Fair	Poor in substratum for sand.	Poor	Water table at or near surface; poor stability.	Water table at or near surface; poor stability; severe frost action.
Plummer: Pe	Good	Fair	Severe	Poor	Fair to good in substratum for sand; fair for gravel.	Poor	Water table at or near surface; poor stability.	Water table at or near surface; poor stability; severe frost action.
Pocomoke: P Pm.	Fair	Poor	Severe	Good [5]	Fair in substratum for sand.	Fair	Water table at or near surface; fair stability.	Water table at or near surface; fair stability; severe frost action.
Portsmouth: Pr, Pt.	Poor	Not suitable.	Severe	Good [5]	Fair in substratum for sand.	Fair to poor.	Water table at or near surface; poor stability.	Water table at or near surface; poor stability; severe frost action.
Rutledge: Ru	Poor	Poor	Severe	Fair [3]	Fair to good in substratum for sand; fair in substratum for gravel.	Poor	Water table at or near surface; poor stability.	Water table at or near surface; poor stability; severe frost action.
Sassafras: SaA, SaB2, SaC2, SaC3, SaD, SaE, SmA, SmB2.	Fair	Fair	Moderate	Good	Fair in substratum for sand and gravel.	Good	Water table at depth of more than 5 feet; good stability.	Good stability; moderate frost action.
St. Johns: St, Su	Good	Fair	Severe	Fair	Fair in substratum for sand.	Poor	Water table at or near surface; poor stability.	Water table at or near surface; poor stability.
Tidal marsh: Tm	Variable	Not suitable.	Severe	Not suitable.	Not suitable.	Not suitable.	Fluctuating saline water table; very poor stability; tidal flooding.	Fluctuating saline water table; very poor stability; tidal flooding; severe frost action.

See footnotes at end of table.

interpretations—Continued

Soil features that affect engineering practices for—Continued					
Sites for ponds or reservoirs	Dikes, levees, and other embankments [4]	Drainage systems	Irrigation	Terraces or diversions	Waterways
Variable seepage; water source generally constant; high water table.	Unstable; hazard of shrinkage and subsidence.	Variable permeability and erodibility; hazard of shrinkage and subsidence.	High available moisture capacity; variable infiltration; hazard of shrinkage and subsidence.	Variable erodibility; unstable.	High available moisture capacity; low fertility.
Low seepage in subsoil; high seepage in substratum; high fluctuating water table.	Poor stability; highly erodible; low to medium porosity if compacted.	Moderately slow permeability; highly erodible.	High available moisture capacity; moderate infiltration; poor natural drainage.	Highly erodible; poor stability.	High available moisture capacity; moderate fertility.
High to excessive seepage; high water table.	Poor stability; high porosity.	Rapid permeability; hazard of ditchbank caving.	Very low available moisture capacity; rapid infiltration; poor natural drainage.	Poor stability	Very low available moisture capacity; low fertility.
Moderate seepage in subsoil; high seepage in substratum; high water table.	Fair stability; moderately erodible; low porosity if compacted.	Moderate permeability; moderately erodible.	High available moisture capacity; moderate to rapid infiltration; poorly drained to very poorly drained.	Moderately erodible; fair stability.	High available moisture capacity; moderate fertility.
Low seepage in subsoil; high seepage in substratum; high water table.	Poor stability; highly erodible; low porosity if compacted.	Moderate to moderately slow permeability; highly erodible.	High available moisture capacity; moderate infiltration; very poorly drained.	Highly erodible; poor stability.	High available moisture capacity; moderate fertility.
High to excessive seepage; high water table.	Poor stability; high porosity.	Rapid permeability; hazard of ditchbank caving.	Very low available moisture capacity; rapid infiltration; very poorly drained.	Poor stability	Very low available moisture capacity and fertility.
Moderate seepage in subsoil; high seepage in substratum; water table at depth of more than 5 feet.	Good stability; moderately erodible; low porosity if compacted.	Well drained	Moderate to high available moisture capacity; moderate to rapid infiltration; well drained.	Moderately erodible; good stability.	Moderate to high available moisture capacity; moderate fertility.
High to excessive seepage; high water table.	Poor stability; high porosity.	Moderate permeability; hazard of ditchbank caving.	Low available moisture capacity; rapid infiltration; very poorly drained.	Poor stability	Low available moisture capacity; very low fertility.
Variable seepage; suited to tidal developments; high water table.	Very poor stability; variable porosity.	Tidal flooding	Tidal flooding	Tidal flooding	Tidal flooding.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability for earthwork when soil is—		Susceptibility to frost action—	Suitability as source of—			Soil features that affect engineering practices for—	
	Wet	Frozen		Topsoil [1]	Sand or gravel	Road fill	Pipeline location [2]	Highway location [3]
Woodstown: WdA, WdB, WoA, WoB.	Fair	Poor	Severe	Good	Fair in substratum for sand and gravel.	Good	Water table at depth of 1½ to 2½ feet; good stability.	Water table at depth of 1½ to 2½ feet; good stability; severe frost action.

[1] Topsoil rating is for the surface layer only or to a depth of 10 inches or less.
[2] For corrosion potential of soil layers affecting pipeline construction, see table 5.
[3] Degree and kind of limitation for roads and highway and for streets and parking lots in dense areas are given in table 7 under "Town and Country Planning."

Engineering interpretations of the soils

Table 6 rates the soils in Worcester County according to their suitability for earthwork, both when the soils are wet and when they are frozen. It also rates the soils according to their susceptibility to frost action and their suitability as a source of topsoil, sand or gravel, and roadfill.

In addition, table 6 lists soil features that affect different kinds of engineering work. The features shown are those that affect the location and the construction of pipelines; the location of highways; sites for ponds or reservoirs; the use of soil materials for dikes, levees, and other embankments; the installation of drainage systems; irrigation practices; and the construction of terraces or diversions, and waterways. The interpretations are based on information given in the seciton "Descriptions of the Soils," the test data in table 4, the estimated properties in table 5, and on the experience of engineers in the county. They are for the representative profile of each series.

Table 6 indicates both the desirable and undesirable features of a soil that may require special consideration before a structure is planned, designed, and constructed. A soil may be suitable for one engineering use but may be poor or even unsuitable for another. Elkton silt loam, for example, is well suited as a site for a reservoir, but it is unsuitable as a source of sand. In contrast, Lakeland soils are a good source of clean fine sand, but they generally are too porous for use as a reservoir site. Also, a subsoil of silty clay, such as that in the Elkton soils, has characteristics that make it poor for embankment material. Such a subsoil is unstable and highly erodible, and it cannot be compacted to a suitable dry density. Because the subsoil is very slowly permeable, however, it may be suitably used as the core of a dam to reduce seepage. Fine texture and slow permeability in a subsoil increase the difficulty of providing adequate drainage for such soils, and they limit the suitability of the soil for irrigation.

The suitability of a soil as a site for laying a pipeline is determined mainly by the natural stability of the soil and by the height and seasonal fluctuation of the water table. If the water table is high, laying a line for sewage, water, or gas in wet soils is difficult and frustrating because ditchbanks are likely to collapse. In some soils the banks are unstable even where the water table is not high.

In selecting a soil to be used as a site for a road or highway, the choice is affected primarily by the height and the fluctuation of the water table; by the hazard of flooding; by the stability of the soil materials, particularly under heavy load or pressure; and by the expected severity of frost action. The soil features listed in table 7 that affect the suitability for highway location do not include gradient and some other slope characteristics, but the effect of slope on the stability and erodibility of soil material generally increases with increases in gradient and complexity of the slope.

The choice of a soil for a pond or reservoir site depends largely on the depth to the water table and on the rate of seepage that can be expected, particularly at the bottom of the reservoir area.

The ponds in the area are excavated or are impounded. An excavated pond is one that is dug out of the natural terrain and generally is in an area where the water table is near the surface. In soils where the water table is at a depth that commonly does not affect the location of a pond and the water table is not a source of water, ponds are constructed by placing earth dams across drainageways. In such soils the pond may be excavated, impounded, or both. A constant and reliable source of water from springs, runoff, or streams is desirable. Such a source is especially necessary if seepage or other losses are significant. Most small ponds are excavated because the topography is level or nearly level, the substratum is pervious, and the water table is high. These excavations penetrate the sandy substratum, and they commonly are to a depth of 8 to 10 feet. In soils that have a high seepage rate and a seasonal high water table, the water level in excavated ponds is expected to fluctuate.

The suitability of a soil as embankment material for dikes, levees, dams, or other structures is affected primarily by stability, erodibility, and the maximum dry density of the soil material. Organic horizons, or soil layers that have a high content of organic matter, are considered to be unsuitable for use as embankment material. The maxi-

interpretations—Continued

Soil features that affect engineering practices for—Continued					
Sites for ponds or reservoirs	Dikes, levees, and other embankments [4]	Drainage systems	Irrigation	Terraces or diversions	Waterways
Moderate seepage in subsoil; high seepage in substratum; fluctuating water table at depth of 1½ to 2½ feet.	Good stability; moderately erodible; low porosity if compacted.	Moderate permeability; moderately erodible.	Moderate to high available moisture capacity; moderate to rapid infiltration; impeded drainage.	Moderately erodible; good stability.	Moderate to high available moisture capacity; moderate fertility.

[4] Where soil porosity is listed without reference to compaction in this column, it indicates that porosity is essentially the same in compacted or noncompacted material.
[5] The surface layer is high to very high in content of organic matter, and the rating is only for those areas where topsoil rich in organic matter is desirable.

mum density to which a soil material can be compacted in an earthen structure affects the strength and permeability of the structure. All earthen dams allow some seepage, but generally it is desirable to keep such water loss to a minimum. Consequently, soils that can be compacted to the highest maximum density are desirable because they have greater stability and less seepage. Soils in which the maximum density can be obtained by ordinary methods of compaction are those having a well-graded mixture of particle sizes and sufficient fine material to fill the voids and bind the particles when compacted.

The ease or difficulty with which a soil can be drained artificially is determined mainly by the least permeable layer or layers, by the height and fluctuation of the water table, and by the stability and erodibility of the bottom and banks of drainage ditches.

Soil features that affect the kind and design of an irrigation system are the rate that applied water can infiltrate the soil, the capacity of the soil to retain moisture, and the degree of natural drainage. If surface or internal drainage is inadequate, a properly designed artificial drainage system should be installed. If irrigation water is likely to become ponded, depressions should be filled and the surface should be graded or leveled.

In planning and designing terraces and diversions, the stability and erodibility of the surface soil are of special concern. These features, as well as the available moisture capacity and fertility of the soil, strongly influence the design of waterways and the selection of grasses or other vegetation needed for sodding and stabilizing the waterways.

Town and Country Planning

Worcester County is still a rural area, but its population is growing. In recent years there has been an increase in residential and commercial uses of the land, especially near Pocomoke City and Ocean City and along some highways in the county. It is probable that the present trend will continue.

The spread of residential and related developments into rural areas has increased the need for information about soil conditions that affect nonfarm uses and recreational uses. The most common need is for information about the limitations of soils that affect use for disposing of sewage effluent from septic tanks. Less common needs are requests for information about the use of soils for building locations, earth moving and landscaping, streets and parking lots, and the like.

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Much of the information in this subsection is in tables 7 and 8. Table 7 gives limitations of all soils in the county for selected nonfarm uses. In table 8 are soil limitations that affect specified recreational uses. In both tables the limitations are rated slight, moderate, or severe. A rating of *slight* indicates that the soil has few or no limitations and is considered desirable for the use named. A rating of *moderate* shows that a moderate problem is recognized but can be overcome or corrected. A rating of *severe* indicates that use of the soil is severely limited by a hazard or restriction that is difficult to overcome. A rating of severe for a particular use does not mean to imply that a soil so rated *cannot* be put to that use. The limitation of the soil for a particular use is based on the most unfavorable limitation. For example, if a soil is in an area where flooding is a serious hazard, the limitation for septic tanks is severe, even though the soil may be otherwise well suited to that use.

Following are the properties that limit the soils of the county in their suitability for each nonfarm use specified in table 7. The ratings, particularly those for sewage disposal, apply only to areas where housing density is low. Where density is high or if high density housing is planned, a community sewage system or some other special method for the disposal of sewage is needed.

Septic tank filter fields: Permeability, depth to seasonal high water table, depth to an impervious layer, slope, and hazard of flooding.

Sewage lagoons: Permeability, depth to an impervious layer, slope, and hazard of flooding.

House with basements (three stories or less): Depth to water table, natural drainage, slope, hazard of flooding, and texture of the surface soil. The suitability of a soil for industrial or commercial buildings and for homes of more than three stories should be investigated at the site.

TABLE 7.—*Soil limitations*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The the instructions for referring to other

Soil series[1] and map symbol	Sewage disposal: Septic tank filter fields (effluent disposal on site)	Sewage disposal: Lagoons[2]	Homes with basements (three stories or less)
Coastal beaches:			
CbB	Severe: fluctuating saline water table; tidal flooding.[5]	Severe: very rapid permeability; tidal flooding.[5]	Severe: fluctuating saline water table; tidal flooding; poor stability.
CbC	Severe: fluctuating water table; tidal flooding.[5]	Severe: very rapid permeability; tidal flooding; slope.[5]	Severe: fluctuating water table; tidal flooding; poor stability.
Elkton: Ek, El, Em	Severe: high water table; slow permeability.	Slight	Severe: high water table
Fallsington: Fa, Fg	Severe: high water table	Moderate: moderate permeability.	Severe: high water table
Fort Mott:			
FmA	Slight	Moderate: moderate permeability.	Slight
FmB	Slight	Moderate: moderate permeability; slope.	Slight
FmC	Slight	Severe: slope	Slight
FmC3	Slight	Severe: slope	Slight
FmD	Moderate: slope	Severe: slope	Moderate: slope
Klej:			
KsA	Moderate: seasonal high water table.[5]	Severe: rapid permeability [5]	Moderate: seasonal high water table.[5]
KsB	Moderate: seasonal high water table.[5]	Severe: rapid permeability [5]	Moderate: seasonal high water table.[5]
*Lakeland:			
LaD	Moderate: slope [5]	Severe: rapid permeability; slope.[5]	Moderate: slope
LkD	Moderate: slope [5]	Severe: rapid permeability; slope.[5]	Moderate: slope
LkE	Severe: slope [5]	Severe: rapid permeability; slope.[5]	Moderate: slope [6]
LlB	Slight [5]	Severe: rapid permeability [5]	Slight
LmB, LoB (For properties of Fort Mott soil in mapping unit LoB, refer to the Fort Mott series.)	Slight [5]	Severe: rapid permeability [5]	Slight
LoC (For properties of Fort Mott soil in mapping unit LoC, refer to the Fort Mott series.)	Slight [5]	Severe: rapid permeability; slope.[5]	Slight
Leon: Ls	Severe: high water table [5]	Severe: moderate to modately rapid permeability.[5]	Severe: high water table

See footnotes at end of table.

for selected nonfarm uses

soils in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully series in the first column of this table]

Roads and highways	Streets and parking lots in dense areas [3]	Sanitary land fills (trench method)	Cemeteries	Home gardens [4]
Severe: fluctuating saline water table; tidal flooding; poor stability.	Severe: fluctuating saline water table; tidal flooding; poor stability.	Severe: fluctuating saline water table; tidal flooding.[5]	Severe: fluctuating water table; tidal flooding; sandy.	Severe: droughtiness; low fertility; salinity; cutting by windblown sand.
Severe: fluctuating water table; tidal flooding; poor stability.	Severe: fluctuating water table; tidal flooding; poor stability; slope.	Severe: fluctuating water table; tidal flooding.[5]	Severe: fluctuating water table; tidal flooding; sandy.	Severe: droughtiness; low fertility; salinity; cutting by windblown sand.
Severe: high water table.	Severe: high water table.	Severe: high water table; plastic material.	Severe: high water table; slow permeability.	Severe: poor drainage.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: poor drainage.
Slight.	Slight.	Slight [5].	Moderate: loamy sand surface layer.	Moderate: low moisture capacity.
Slight.	Moderate: slope.	Slight [5].	Moderate: loamy sand surface layer.	Moderate: low moisture capacity; slope.
Moderate: slope.	Severe: slope.	Slight [5].	Moderate: loamy sand surface layer.	Severe: slope.
Moderate: slope.	Severe: slope.	Slight [5].	Moderate: loamy sand surface layer; severely eroded.	Severe: slope; severely eroded.
Moderate: slope.	Severe: slope.	Moderate: slope [5].	Moderate: loamy sand surface layer; slope.	Severe: slope.
Moderate: seasonal high water table.[5]	Moderate: seasonal high water table.	Moderate: seasonal high water table.[5]	Severe: seasonal high water table; deep loose loamy sand.	Severe: low moisture capacity: impeded drainage.
Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table. [5]	Severe: seasonal high water table; deep loose loamy sand.	Severe: low moisture capacity; impeded drainage.
Moderate: slope.	Severe: slope.	Moderate: slope [5].	Severe: deep loose sand.	Severe: very low moisture capacity; very low fertility.
Moderate: slope.	Severe: slope.	Moderate: slope [5].	Severe: deep loose loamy sand.	Severe: very low moisture capacity; low fertility.
Severe: slope.	Severe: slope.	Severe: slope [5].	Severe: deep loose loamy sand; slope.	Severe: very low moisture capacity; low fertility; slope.
Slight.	Slight: moderate on slopes of more than 2 percent.	Slight [5].	Severe: deep loose sand.	Severe: very low moisture capacity; low fertility.
Slight.	Slight: moderate on slopes of more than 2 percent.	Slight [5].	Severe: deep loose loamy sand.	Severe: very low moisture capacity; low fertility.
Moderate: slope.	Severe: slope.	Slight [5].	Severe: deep loose loamy sand.	Severe: very low moisture capacity; low fertility.
Moderate: high water table.	Moderate: high water table.	Severe: high water table.[5]	Severe: high water table; loose loamy sand surface layer.	Severe: very low moisture capacity; low fertility; somewhat poor drainage.

TABLE 7.—*Soil limitations*

Soil series [1] and map symbol	Sewage disposal: Septic tank filter fields (effluent disposal on site)	Sewage disposal: Lagoons [2]	Homes with basements (three stories or less)
Matapeake:			
MdA, MeA	Slight to moderate: moderate permeability.	Moderate: moderate permeability.	Slight.
MdB, MeB	Slight to moderate: moderate permeability.	Moderate: moderate permeability; slope.	Slight.
MdC, MeC	Slight to moderate: moderate permeability.	Severe: slope.	Slight.
MkC3	Slight to moderate: moderate permeability.	Severe: slope.	Slight.
MkD	Moderate: moderate permeability; slope.	Severe: slope.	Moderate: slope.
MkE	Severe: slope.	Severe: slope.	Moderate: slope [6].
Mattapex:			
MoA, MpA, MtA	Severe: moderately slow permeability.	Slight.	Moderate: seasonal high water table.
MoB, MpB, MtB	Severe: moderately slow permeability.	Moderate: slope.	Moderate: seasonal high water table.
Mixed alluvial land: My	Severe: high water table; flood hazard. [5]	Severe: flood hazard [5].	Severe: high water table; flood hazard.
Muck: Mz	Severe: ponding; flood hazard. [5]	Severe: ponding; flood hazard.[5]	Severe: ponding; flood hazard; poor stability.
Othello: Ot	Severe: high water table; moderately slow permeability.	Slight.	Severe: high water table.
Plummer: Pe	Severe: high water table [5].	Severe: rapid permeability [5].	Severe: high water table.
Pocomoke: Pk, Pm	Severe: high water table.	Moderate: moderate permeability.	Severe: high water table.
Portsmouth: Pr, Pt	Severe: high water table; moderate to moderately slow permeability.	Moderate: moderate to moderately slow permeability.	Severe: high water table.
Rutledge: Ru	Severe: high water table [5].	Severe: rapid permeability [5].	Severe: high water table.
Sassafras:			
SaA, SmA	Slight.	Moderate: moderate permeability.	Slight.
SaB2, SmB2	Slight.	Moderate: moderate permeability; slope.	Slight.
SaC2	Slight.	Severe: slope.	Slight.
SaC3	Slight.	Severe: slope.	Slight.
SaD	Moderate: slope.	Severe: slope.	Moderate: slope.
SaE	Severe: slope.	Severe: 15 to 30 percent slopes.	Moderate: slope [6].

See footnotes at end of table.

for selected nonfarm uses—Continued

Roads and highways	Streets and parking lots in dense areas [3]	Sanitary land fills (trench method)	Cemeteries	Home gardens [4]
Slight	Slight	Slight	Slight	Slight.
Slight	Moderate: slope	Slight	Slight	Moderate: slope.
Moderate: slope	Severe: slope	Slight	Slight	Severe: slope.
Moderate: slope	Severe: slope	Slight	Moderate: severely eroded.	Severe: slope; severely eroded.
Severe: slope	Severe: slope	Moderate: slope	Moderate: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table; moderately slow permeability.	Moderate: impeded drainage.
Moderate: seasonal high water table.	Moderate: seasonal high water table; slope.	Moderate: seasonal high water table.	Moderate: seasonal high water table; moderately slow permeability.	Moderate: impeded drainage; slope.
Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.[5]	Severe: high water table; flood hazard.	Severe: poor drainage; flood hazard.
Severe: ponding: flood hazard; poor stability.	Severe: ponding; flood hazard; poor stability.	Severe: ponding; flood hazard; poor stability.[5]	Severe: ponding; flood hazard; poor stability.	Severe: very poor drainage; flood hazard.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: poor drainage.
Severe: high water table.	Severe: high water table.	Severe: high water table.[5]	Severe: high water table; deep loose loamy sand.	Severe: very low moisture capacity; low fertility; poor drainage.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: very poor drainage.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: very poor drainage.
Severe: high water table.	Severe: high water table.	Severe: high water table.[5]	Severe: high water table; deep loose loamy sand.	Severe: very low moisture capacity; very low fertility; very poor drainage.
Slight	Slight	Slight	Moderate: sandy loam surface layer.	Slight.
Slight	Moderate: slope	Slight	Moderate: sandy loam surface layer.	Moderate: slope.
Moderate: slope	Severe: slope	Slight	Moderate: sandy loam surface layer.	Severe: slope.
Moderate: slope	Severe: slope	Slight	Moderate: sandy loam surface layer; severely eroded.	Severe: slope; severely eroded.
Moderate: slope	Severe: slope	Moderate: slope	Moderate: sandy loam surface layer; slope.	Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.

TABLE 7.—*Soil limitations*

Soil series [1] and map symbol	Sewage disposal		Homes with basements (three stories or less)
	Septic tank filter fields (effluent disposal on site)	Lagoons [2]	
St. Johns: St, Su	Severe: high water table [5]	Severe: rapid permeability in substratum.[5]	Severe: high water table
Tidal marsh: Tm	Severe: tidal flooding	Severe: tidal flooding	Severe: tidal flooding
Woodstown:			
WdA	Moderate: seasonal high water table.	Moderate: moderate permeability.	Moderate: seasonal high water table.
WdB	Moderate: seasonal high water table.	Moderate: moderate permeability; slope.	Moderate: seasonal high water table.
WoA	Moderate: seasonal high water table.	Moderate: moderate permeability.	Moderate: seasonal high water table.
WoB	Moderate: seasonal high water table.	Moderate: moderate permeability; slope.	Moderate: seasonal high water table.

[1] Not included in this table, because their characteristics are too variable to rate, are the land types Gravel and borrow pits (Gb) and Made land (Ma).
[2] It is assumed that a surface horizon that contains appreciable amounts of organic matter will be removed and that the floor of the lagoon will be on the least permeable layer of soil; if the floor is on a more rapidly permeable layer, the limitation is more severe.
[3] Dense areas are defined as areas in subdivisions, or areas crisscrossed at short intervals by paved streets, where street grades are kept

Roads and highways and streets and parking lots in dense areas: Depth to water table, natural drainage, slope, stability, hazard of flooding, and severity of frost action. Roads and highways are in open areas and therefore are less limited by slope than streets and parking lots in dense areas.

Sanitary land fills (trench methods): Permeability, depth to water table, natural drainage, slope, and hazard of flooding are limitations. It is assumed that only local fill or cover material is used.

Cemeteries: Permeability, depth to water table, depth to a hard layer, natural drainage, slope, plasticity and stability of the subsoil and substratum, texture of the surface soil, hazard of erosion, and hazard of flooding.

Home gardens: Permeability of the subsoil, moisture-holding capacity, fertility, depth to water table, natural drainage, slope, texture of the plow layer, and hazard of and degree of erosion. The ratings are for vegetable and flower gardens and for small ornamental plantings and the like that are limited in size but require intensive cultivation.

Another group of uses closely related to community development are those for outdoor recreation. Table 8 rates the soils of the county according to their limitations for various facilities of outdoor recreation that depend a great deal on soil properties. Among these facilities are campsites, including tent and trailer sites, where foot and vehicular traffic are heavy and there is contiguous parking; athletic fields (baseball diamonds, football fields, volleyball courts) and other intensive play areas; parks, picnic areas, and play areas where foot traffic generally is not heavy; lawns, golf fairways, and landscaping and related uses; and paths and trails for hiking, studying nature, or enjoying the scenery.

The major properties that limit the use of the soils for recreational activities are wetness, natural drainage, depth to the water table, slope, texture and stability of the surface soil, degree of erosion, and soil permeability, which affects the ease or difficulty of improving drainage.

A soil feature may cause a soil to be rated *severe* for one recreational use but *slight* for another recreational use. Slopes of more than 5 percent, for example, severely limit use of a soil for a baseball or soccer field. On the other hand, soils that have slopes of as much as 8 or 10 percent can be used as sites for play and picnic areas and those that have slopes of as much as 25 percent can be used for paths and trails if no other limiting factor is present. A soil that is well suited to farming also generally is suitable for building sites and other nonfarm uses.

Service buildings and sewage disposal are important in some forms of recreation, particularly those associated with tenting areas and trailer camps. Soil features that limit soils for service buildings (such as washrooms, bathhouses, and picnic shelters), as well as for year-round cottages, are about the same as those that affect use for homesites (see table 7). Wetness is less limiting, however, if the service building or cottage has no basement. Limitations on soils for sewage effluent disposal by septic tank is also given in table 7. In general, in this county, only the level to gently sloping soils of the Fort Mott, Lakeland, Mata-

for selected nonfarm uses—Continued

Roads and highways	Streets and parking lots in dense areas [3]	Sanitary land fills (trench method)	Cemeteries	Home gardens [4]
Severe: high water table.	Severe: high water table.	Severe: high water table.[5]	Severe: high water table; loose loamy sand surface layer.	Severe: low moisture capacity; very low fertility; very poor natural drainage.
Severe: tidal flooding----	Severe: tidal flooding---	Severe: tidal flooding---	Severe: tidal flooding---	Severe: tidal flooding; salinity.
Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table; sandy loam surface layer.	Moderate: impeded drainage.
Moderate: seasonal high water table.	Moderate: seasonal high water table; slope.	Moderate: seasonal high water table.	Moderate: seasonal high water table; sandy loam surface layer.	Moderate: impeded drainage; slope.
Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: impeded drainage.
Moderate: seasonal high water table.	Moderate: seasonal high water table; slope.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: impeded drainage; slope.

to a minumum, and individual lots generally are less than 1 acre in size.

[4] Vegetable or flower gardens that generally are intensively managed, and concentrations of shrubbery or other ornamental plants.

[5] Possibility of polluting nearby wells, springs, ponds, streams, or other water areas.

[6] Limitation is severe in rapidly expanding areas or in dense residential areas where slopes are more than about 15 percent.

peake, and Sassafras series have no more than *slight* limitations for homes with basements. Of these, only the Fort Mott, Lakeland, and Sassafras soils have only slight limitations for sewage disposal by septic tanks.

Soils of the county that have only slight limitations for athletic fields and other intensive play areas are those of the Fort Mott, Matapeake, and Sassafras series that have slopes of no more than 2 percent. These soils occupy only about 5 percent of the county. Many other soils, however, are only moderately limited for intensive play areas. These soils are seasonally wet, have slopes up to 5 or 6 percent, are too coarse textured to provide a suitable surface for play, or are too slow to dry after a rain. Nearly 28 percent of Worcester County is made up of soils that have no more than slight limitations for use as general parks or for extensive play and picnic areas. Level soils are preferred for such uses, but it is not necessary if foot traffic is light.

Areas in the county made up of steep ravines and narrow bottom lands are poorly suited to farming or to use as building sites but are useful for recreation. Many such areas can be used as sites for ponds, and the ponds and adjoining land can be reserved for parks that have potential for aquatic sports.

Many residential and community uses of land result in the soil being exposed, and a similar situation exists along some bays and river shores. The Worcester Soil Conservation District can suggest sod plants, ground cover, shrubs, vines, and trees that can be used to stabilize and protect the soil under such circumstances. The District also can suggest ways to remove the excess water that is a problem in many areas that would otherwise be suitable sites for recreational buildings or other structures.

Formation, Morphology, and Classification of Soils

In this section the factors that affect the formation of the soils in Worcester County are discussed and important processes in the morphology of the soils are described. Then the classification of each soil series by higher categories is given.

Factors of Soil Formation

Soils are the products of soil-forming processes acting upon materials altered or deposited by geologic forces. The five main factors in the formation of soils are climate, plants and animals, parent material, relief, and time. The relative importance of each factor varies from place to place. In some places one factor is dominant and fixes most of the properties of the soil. Generally, however, the interaction of all five factors determines the kind of soil that develops in any given place.

Climate.—Worcester County has the humid, modified continental climate that is typical of most coastal or near coastal areas of the Middle Atlantic States. Facts about temperature and precipitation are given in the section "General Nature of the County."

TABLE 8.—*Soil limitations for specified recreational uses*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions for referring to other series that appear in the first column of this table]

Soil series and map symbols [1]	Campsites (intensive use)	Athletic fields and other intensive play areas	Parks and extensive play and picnic areas	Lawns and fairways	Paths and trails
Coastal beaches:					
CbB	Severe: fluctuating saline water table; tidal flooding; sandy.	Severe: fluctuating saline water table; tidal flooding; sandy.	Severe: tidal flooding; sandy.	Severe: tidal flooding; sandy.	Severe: sandy.
CbC	Severe: fluctuating water table; tidal flooding; sandy.	Severe: fluctuating water table; tidal flooding; sandy; slope.	Severe: tidal flooding; sandy.	Severe: tidal flooding; sandy.	Severe: sandy.
Elkton: Ek, El, Em	Severe: high water table; slow to very slow permeability.	Severe: high water table; slow to very slow permeability.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Fallsington: Fa, Fg	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Fort Mott:					
FmA	Slight	Slight	Slight	Moderate: loamy sand surface layer.	Moderate: loamy sand surface layer.
FmB	Slight	Moderate: slope	Slight	Moderate: loamy sand surface layer.	Moderate: loamy sand surface layer.
FmC	Moderate: slope	Severe: slope	Slight	Moderate: loamy sand surface layer.	Moderate: loamy sand surface layer.
FmC3	Moderate: slope	Severe: slope	Slight	Moderate: loamy sand surface layer; severely eroded.	Moderate: loamy sand surface layer.
FmD	Moderate: slope	Severe: slope	Moderate: slope	Moderate: loamy sand surface layer; slope.	Moderate: loamy sand surface layer.
Klej:					
KsA	Moderate: high water table; deep loose loamy sand.	Moderate: high water table; deep loose loamy sand.	Moderate: deep loose loamy sand.	Severe: deep loose loamy sand.	Moderate: deep loose loamy sand.
KsB	Moderate: high water table; deep loose loamy sand.	Moderate: high water table; deep loose loamy sand; slope.	Moderate: deep loose loamy sand.	Severe: deep loose loamy sand.	Moderate: deep loose loamy sand.
*Lakeland:					
LaD	Severe: deep loose sand.	Severe: deep loose sand; slope.	Severe: deep loose sand.	Severe: deep loose sand.	Moderate: deep loose sand.
LkD	Moderate: deep loose loamy sand; slope.	Severe: deep loose loamy sand; slope.	Moderate: deep loose loamy sand; slope.	Severe: deep loose loamy sand.	Moderate: deep loose loamy sand.
LkE	Severe: deep loose loamy sand; slope.	Severe: deep loose loamy sand; slope.	Severe: deep loose loamy sand; slope.	Severe: deep loose loamy sand; slope.	Moderate: deep loose loamy sand; slope.
LlB	Severe: deep loose sand.	Severe: deep loose sand.	Severe: deep loose sand.	Severe: deep loose sand.	Moderate: deep loose sand.
LmB, LoB (For properties of Fort Mott soil in mapping unit LoB, refer to Fort Mott series in this table.)	Moderate: deep loose loamy sand.	Moderate: deep loose loamy sand; slope.	Moderate: deep loose loamy sand.	Severe: deep loose loamy sand.	Moderate: deep loose loamy sand.

See footnote at end of table.

TABLE 8.—*Soil limitations for specified recreational uses*—Continued

Soil series and map symbols [1]	Campsites (intensive use)	Athletic fields and other intensive play areas	Parks and extensive play and picnic areas	Lawns and fairways	Paths and trails
*Lakeland—Continued					
LoC (For properties of Fort Mott soil in mapping unit LoC, refer to Fort Mott series in this table.)	Moderate: loose deep loamy sand; slope.	Severe: slope	Moderate: deep loose loamy sand.	Severe: deep loose loamy sand.	Moderate: deep loose loamy sand.
Leon: Ls	Severe: high water table.	Severe: high water table.	Moderate: high water table; loose loamy sand surface layer.	Severe: loose loamy sand surface layer.	Moderate: high water table; loose loamy sand surface layer.
Matapeake:					
MdA, MeA	Slight	Slight	Slight	Slight	Slight.
MdB, MeB	Slight	Moderate: slope	Slight	Slight	Slight.
MdC, MeC	Moderate: slope	Severe: slope	Slight	Slight	Slight.
MkC3	Moderate: slope	Severe: slope	Slight	Moderate: severely eroded.	Slight.
MkD	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope	Slight.
MkE	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
Mattapex:					
MoA, MpA, MtA	Moderate: high water table; moderately slow permeability.	Moderate: high water table; moderately slow permeability.	Slight	Slight	Slight.
MoB, MpB, MtB	Moderate: high water table; moderately slow permeability.	Moderate: high water table; moderately slow permeability; slope.	Slight	Slight	Slight.
Mixed alluvial land: My	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.
Muck: Mz	Severe: ponding; flood hazard; poor stability.	Severe: ponding; flood hazard; poor stability.	Severe: ponding; flood hazard; poor stability.	Severe: ponding; flood hazard; poor stability.	Severe: ponding; flood hazard; poor stability.
Othello: Ot	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Plummer: Pe	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table; deep loose loamy sand.	Severe: high water table.
Pocomoke: Pk, Pm	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Portsmouth: Pr, Pt	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Rutlege: Ru	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table; deep loose loamy sand.	Severe: high water table.
Sassafras:					
SaA	Slight	Slight	Slight	Moderate: sandy loam surface layer.	Slight.

See footnote at end of table.

TABLE 8.—*Soil limitations for specified recreational uses*—Continued

Soil series and map symbols [1]	Campsites (intensive use)	Athletic fields and other intensive play areas	Parks and extensive play and picnic areas	Lawns and fairways	Paths and trails
Sassafras—Continued					
SaB2	Slight	Moderate: slope	Slight	Moderate: sandy loam surface layer.	Slight.
SaC2	Moderate: slope	Severe: slope	Slight	Moderate: sandy loam surface layer.	Slight.
SaC3	Moderate: slope	Severe: slope	Slight	Moderate: sandy loam surface layer; severely eroded:	Slight.
SaD	Moderate: slope	Severe: slope	Moderate: slope	Moderate: sandy loam surface layer; slope.	Slight.
SaE	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
SmA	Slight	Slight	Slight	Slight	Slight.
SmB2	Slight	Moderate: slope	Slight	Slight	Slight.
St. Johns: St, Su	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table; loose loamy sand surface layer.	Severe: high water table.
Tidal marsh: Tm	Severe: tidal flooding.	Severe: tidal flooding.	Severe: tidal flooding.	Severe: tidal flooding.	Severe: tidal flooding.
Woodstown:					
WdA	Moderate: high water table.	Moderate: high water table.	Slight	Moderate: sandy loam surface layer.	Slight.
WdB	Moderate: high water table.	Moderate: high water table; slope.	Slight	Moderate: sandy loam surface layer.	Slight.
WoA	Moderate: high water table.	Moderate: high water table.	Slight	Slight	Slight.
WoB	Moderate: high water table.	Moderate: high water table; slope.	Slight	Slight	Slight.

[1] Not included in this table, because their characteristics are too variable to estimate, are the land types Gravel and borrow pits (Gb) and Made land (Ma).

The climate is fairly uniform throughout the county. There are no significant differences in elevation and no obstructions to the movement of wind, clouds, and rainstorms. Masses of air generally move through the county from a northwesterly direction, but they are warmed by air that moves in periodically from the south and southwest. In places local differences in microclimate affect cropping practices and the response of plants.

Because precipitation exceeds evapotranspiration, the humid, rather uniform climate has caused the soils to be strongly leached. Most of the soluble materials that were originally present or that were released through weathering have been removed by leaching. Largely for this reason, the soils of the county are low in plant nutrients and are strongly acid.

Precipitation is mainly responsible for the subsoil that characterizes most soils in the county. In addition to leaching soluble minerals, water that percolates through the soil moves clay from the surface layer to a subsoil layer and deposits it as films on faces of peds and on walls of pores. Except for soil formed in recent alluvium or sand, soils of the county have a subsoil that contains more clay than the surface layer.

Also influenced by climate is the blocky structure in the subsoil of well-developed soils. The development of peds in the subsoil is caused by changes in volume of the soil mass that is primarily the result of wetting and drying and of freezing and thawing.

Weathering of minerals occurs at a rate that is related to the temperature and moisture supply. In Worcester County the soils are relatively low in content of weatherable minerals. No free carbonates are in the soils, and most of the bases have been leached out. Because the soils formed in transported parent material that previously had undergone one or more cycles of erosion, these materials may have been highly weathered or leached at the time they were deposited.

Plants and animals.—Before the county was settled, the native vegetation had a major influence on the development of the soils. Although little is known about the effects of micro-organisms, earthworms, larvae, and other forms of animal life, the activities of these animals were important in the cycle of decay and regeneration of plants.

The settlers found a dense forest that consisted mainly of hardwoods. Oaks were the dominant trees in most parts of the county. Yellow-poplar, sweetgum, blackgum, holly, hickory, maple, dogwood, loblolly pine, pond pine, and Virginia pine also were important, but there probably were few pure stands of pine before the county was settled. The fairly pure stands of pine that exist today, particularly those of loblolly pine, generally are in areas that were once cleared and cultivated. Worcester County is near the northern limit of the natural range of loblolly pine. Most hardwoods use large amounts of calcium and other bases if they are available. Soils that are normally high in bases remain so under a cover of deciduous trees because, in large part, the bases are returned to the soil each year. When leaves fall and then decompose, the bases reenter the soil and are again used by plants.

The soils of Worcester County, however, probably have never been very high in bases; consequently, they are acid even under a cover of hardwoods. Soils that are strongly acid and low in fertility are better suited to pines than to most hardwoods. Pines do not require large amounts of calcium and other bases, and their needles add little fertility to the soil.

As farming developed in the county, man became an important factor in the development of the soils. The clearing of the forests, cultivation for many years in certain areas, introduction of new kinds of crops and other plants, and improvements in drainage have affected development of the soils and will affect their development in the future.

The most important changes brought about by man are (1) mixing the upper horizons of the soil to form a plow layer; (2) tilling sloping soils, which has resulted in accelerated erosion; and (3) liming and fertilizing to change the content of plant nutrients, especially in the upper horizons. The most obvious change in the vegetation in most places is the loss of the original plant cover, for most of the woodland has been cut over and little of the county remains in natural woodland. Also, there has been a notable increase in the number of pines as compared to the number of hardwoods.

Parent material.—The parent material of the soils in the county consisted of sediment transported mainly by water, but in part by wind and by ice floes carried by glacial meltwater. The sediment is more than a mile thick, and it is composed of sand, glauconite, gravel, silt, clay, shale, and shell beds. It lies above hard crystalline basement rock of the Precambrian and Paleozoic ages that dips to the southeast.

Part of the large volume of sediment that underlies the county was carried by streams from the Appalachian Mountains and from the Piedmont province (*4*). The sediment ranges from Cretaceous to Recent times. Most of it, however, was laid down during the Pleistocene epoch.

It is likely that the soil material in marshes and other low-lying areas consists of sediment that was deposited fairly recently in shallow salt water. This sediment was elevated to sea level, either by slow uplift of the land or by fluctuations in the level of the sea and of Chesapeake Bay, or perhaps by both.

The texture of many soils in the county is directly related to the texture of the parent material. Soils of the Lakeland, Klej, Leon, Plummer, Rutlege, and St. Johns series, for example, formed in coarse-textured material consisting chiefly of silica sand and partly of clay, and, in some places, of silt. There is some evidence, however, that their parent material, particularly that of the Lakeland soils, was reworked by wind or by water, or by both, between the time it was deposited and the time it took for the soil to form.

Over the largest part of the county, the sediment making up the parent material consists mainly of sand, but there is a significant amount of silt, clay, or both. In places this material is stratified, and the texture differs in the various layers. Soils of the Fallsington, Fort Mott, Pocomoke, Sassafras, and Woodstown series formed in this kind of parent material.

The Matapeake, Mattapex, Othello, and Portsmouth soils formed in a mantle of silt. This mantle appears to be loess. It is about 36 to 40 inches thick and overlies sandy material.

The finest textured sediment consists chiefly of clay and silty clay but partly of fine sand and very fine sand. Soils of the Elkton series formed in this kind of sediment.

Several kinds of sediment recently have been deposited in the county. Mixed alluvial land, a land type, consists of recent, unconsolidated, fresh-water deposits of variable alluvium; Tidal marsh is made up of recently deposited sediment, mostly clay, that has been affected by salt water and the action of tides; Coastal beaches are water-deposited and wave-worked sand; and Muck is the waterlogged highly organic remains of plants.

More than one kind of soil commonly forms in the same general kind of parent material. Thus, it is evident that factors other than parent material have influenced the kinds of soil that have formed in the county.

Relief.—Worcester County is entirely within the Atlantic Coastal Plain. Most of the county is level and nearly level, but there are fairly large areas that are gently sloping. The slopes are mostly smooth, though some are complex and hummocky and are marked by many small sinks or depressions. Slopes generally range between 0 and 2 percent, but in a few places they are as much as 30 percent. The steeper slopes are generally on breaks above drainageways and occupy less than 0.3 percent of the county.

Local differences in elevations normally are only a few feet. In several areas, however, there are differences of as much as 34 feet to the mile. The highest elevations are in the west-central part of the county; the highest point, near Longridge, is 57 feet above sea level.

The county slopes mainly toward the Pocomoke River to the west, but a small part of it slopes toward Chincoteague Bay and other small bays to the east. Marshes in the county are about at sea level.

The gently sloping relief contributes to the moderately good to good drainage in the Matapeake and Woodstown soils. In the level and nearly level soils, however, water moves slowly through the soils and increases the drainage problem. The Elkton, Fallsington, and Pocomoke soils are examples of soils that are poorly drained or very poorly drained.

Time.—Geologically, the deposits of soil materials in the county range from very young to fairly old. The most recent, or Holocene, deposits are those on alluvial flood plains and in marshy areas affected by tides. In such areas soil material is still being added from year to year when the areas are flooded. Somewhat older geologically are the sand and the silty deposits, which are probably of Pleistocene age. Most of the subsurface deposits in the county are probably of Miocene age, but some may be of Pliocene age (*5*, *7*).

Time accounts for many of the differences among soils. In steep areas soil material is likely to be removed by geologic erosion almost as rapidly as it is formed. On the other hand, in more level areas little or no geologic erosion occurs and the products of the soil-forming processes remain in place as components of genetic soils. Examples are the nearly level or gently sloping Mattapex soils that show definite and, presumable, mature development.

Morphology of Soils

In most of the soils of the county, morphology is expressed by evident horizons. Little horizon differentiation is evident, however, in young alluvial soils and in soils that consist chiefly of sand.

The differentiation of horizons in the soils is the result of one or more of the following processes: (1) accumulation of organic matter; (2) leaching of carbonates and of salts more soluble than calcium carbonate; (3) chemical weathering, chiefly by hydrolysis, of the primary minerals of the parent material into silicate clay minerals; (4) translocation of the silicate clay minerals and probably of some silt-sized particles from one horizon to another; and (5) chemical changes (oxidation, reduction, and hydration) and transfer of iron.

In almost all of the soils of the county, several of these processes have been active in the development of horizons. For example, the interaction of the first, second, third, and fourth processes is reflected in the moderately expressed horizons of the Sassafras soils, and all five processes have been active in the development of the moderately well drained Woodstown soils. Only the first and fifth processes have had any marked effect on the Leon, Rutlege, and St. Johns soils. In most soils, however, the second process, the leaching of carbonates and salts, must have taken place in the soil materials before they were deposited, and some of the other processes may have been active.

Some organic matter has accumulated in the surface layer of all soil series to form an A1 horizon. Through tillage, however, the material in this horizon commonly has been mixed with material from some of the underlying horizons. The A1 horizon has thus lost its identity and becomes a part of an Ap horizon, or plow layer. The content of organic matter varies in the different soils and ranges from very low to very high. The Lakeland soils have a weak A1 horizon that contains little organic matter. Pocomoke, Portsmouth, and St. Johns soils have a prominent A1 horizon in which there is as much as 15 percent or more organic matter in places.

Studies of the clay mineralogy in the soils of the Eastern Shore of Maryland indicate that the clay minerals in these soils are complex and that their surface layer contains large amounts of aluminum interlayered vermiculite. Similar findings have been reported for a Sassafras soil in New Jersey (*3*). Other clay minerals present in small amounts in most Eastern Shore soils are kaolinite, chlorite, mica (illite), and in places montmorillonite.

The translocation of silicate clay minerals has contributed strongly to development of horizons in many of the soils. Silicate clay minerals have been partly removed from the A1 and A2 horizons and partly immobilized in the Bt horizon. This is characterisic of the Elkton, Fallsington, Fort Mott, Matapeake, Mattapex, Othello, Pocomoke, Portsmouth, Sassafras, and Woodstown soils. To a slight degree, it is also characteristic of the Klej and some other soils that do not have a distinct textural B horizon.

The reduction and transfer of iron has occurred to some degree in all the soils that have impeded drainage. In the areas of naturally wet soils in Worcester County, this process, known as gleying, has been of great importance. It has strongly affected the Elkton, Fallsington, Othello, Plummer, Pocomoke, and Portsmouth soils.

Iron that has been reduced in areas where the soil is poorly aerated generally becomes mobile and may be removed from the soil. In most of the soils of this county, however, iron has moved either within the horizon where it originated or to another horizon nearby. Part of this iron may become reoxidized and segregated to form the yellowish-brown, strong-brown, or yellowish-red mottles that indicate impeded drainage and are common in a gleyed horizon.

When silicate clay forms from primary minerals, some iron generally is released as hydrated oxide. Depending on the degree of hydration, these oxides are more or less red. Even a small amount of the oxide will cause the subsoil to have a yellowish to reddish color. In some of the soils, iron oxides color the subsoil, even where there has not been enough accumulation of clay minerals to form a textural, or Bt, horizon. This is characteristic of the Lakeland soils.

A profile that is representative for each soil series in the county is described in the section "Descriptions of the Soils."

Classification of Soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationships to one another and to the whole environment, and to develop principles that help us to understand their behavior and their response to manipulation. First through classification, and then through the use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

Thus, in classification, soils are placed in narrow categories that are used in detailed soil surveys so that knowledge about the soils can be organized and applied in managing farms, fields, and woodlands; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison of large areas, such as countries and continents.

Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 (*2*) and later revised (*8*). The system currently used was adopted for general use by the National Cooperative Soil Survey in 1965. It is under continual study. Therefore, readers interested in development of this

system should search the latest available literature (*6, 11*). In table 9 the soil series of Worcester County are placed in some categories of the current system and in great soil groups of the older system.

The current system of classification has six categories. Beginning with the broadest, these are the order, suborder, great group, subgroup, family, and series. In this system the criteria used as a basis for classification are soil properties that are observable and measurable. The properties are chosen, however, so that the soils of similar genesis, or mode of origin, are grouped together. The classes that make up the current system are briefly defined in the following paragraphs:

ORDERS: Ten soil orders are recognized in the current system. They are Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties used to differentiate the soil orders are those that tend to give broad climatic groupings of soils. The exceptions, Entisols and Histosols, occur in many different climates. Four soil orders are represented in Worcester County—Entisols, Inceptisols, Spodosols, and Ultisols.

Entisols are mineral soils that have been only slightly modified from the geologic material in which they have been formed. They are recent soils that do not have genetic horizons or have only the beginnings of such horizons.

Inceptisols are mineral soils in which horizons have started to develop. They generally occur on young, but not recent, land surfaces.

Spodosols are mineral soils that have horizons in which organic colloids, or iron and aluminum compounds, or both, have accumulated; or they have thin horizons cemented by iron overlying a fragipan.

Ultisols are mineral soils that have a clay-enriched B horizon in which base saturation generally is less than 35 percent. The base saturation decreases as depth increases.

SUBORDERS: Each order is divided into suborders, primarily on the basis of those soil characteristics that seem to produce classes having the greatest genetic similarity. The suborders narrow the broad climatic range permitted in the orders. The soil properties used to separate suborders mainly reflect either the presence or absence of waterlogging or soil differences resulting from the climate or vegetation. Names of suborders have two syllables. The last syllable indicates the order. An example is Aquepts (*Aqu* meaning water or wet, and *ept*, from *Inceptisols*). The suborder classification is not shown in table 9.

GREAT GROUPS: Soil suborders are separated into great groups on the basis of uniformity in the kinds and sequence of major soil horizons and features. The horizons used to make separations are those in which clay, iron, or humus has accumulated or those that have pans interfering with growth of roots or movement of water. The features used are the self-mulching properties of clays, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), and the like.

The names of great groups have three or four syllables and are made by adding a prefix to the name of the suborder. An example is Humaquept (*Hum* for the presence of humus, *aqu* for wetness or water, and *ept* from Inceptisol). The great group is not shown separately in table 9 because the name of the great group is the last word in the name of the subgroup.

SUBGROUPS: Great groups are divided into subgroups, one representing the central (typic) segment of the group and others, called intergrades, that have properties of one great group and also one or more properties of another great group, subgroup, or order. Subgroups may also be made in those instances where soil properties intergrade outside of the range of any other great group, subgroup, or order. The names of subgroups are derived by placing one or more adjectives before the name of the great group. An example is Typic Humaquept (a typical Humaquept).

TABLE 9.—*Classification of soil series according to the current system and the 1938 system with its later revisions*

Series	Current system [1]			1938 system
	Family	Subgroup	Order	Great soil group
Elkton [2]	Clayey, mixed, mesic	Typic Ochraquults	Ultisols	Low-Humic Gley soils.
Fallsington	Fine-loamy, siliceous, mesic	Typic Ochraquults	Ultisols	Low-Humic Gley soils.
Fort Mott	Loamy, siliceous, mesic	Arenic Hapludults	Ultisols	(3).
Klej	Mesic, coated	Aquic Quartzipsamments	Entisols	Regosols.
Lakeland	Siliceous, thermic, coated	Typic Quartzipsamments	Entisols	Regosols.
Leon	Sandy, siliceous, thermic	Aeric Haplaquods	Spodosols	Ground-Water Podzols.
Matapeake	Fine-silty, mixed, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils.
Mattapex	Fine-silty, mixed, mesic	Aquic Hapludults	Ultisols	Gray-Brown Podzolic soils.
Othello	Fine-silty, mixed, mesic	Typic Ochraquults	Ultisols	Low-Humic Gley soils.
Plummer	Siliceous, acid, thermic	Typic Psammequents	Entisols	Regosols.
Pocomoke	Coarse-loamy, siliceous, thermic	Typic Umbraquults	Ultisols	Humic Gley soils.
Portsmouth	Fine-loamy, siliceous, thermic	Typic Umbraquults	Ultisols	Humic Gley soils.
Rutlege	Sandy, siliceous, thermic	Typic Humaquepts	Inceptisols	Humic Gley soils.
Sassafras	Fine-loamy, siliceous, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils.
St. Johns [4]	Sandy, siliceous, hyperthermic	Typic Haplaquods	Spodosols	Ground-Water Podzols.
Woodstown	Fine-loamy, siliceous, mesic	Aquic Hapludults	Ultisols	Gray-Brown Podzolic soils.

[1] Placement of some soil series in the current system of classification, particularly in families, may change as more information becomes available.
[2] In Worcester County, the fine-textured part of the subsoil is thinner than the defined range for the series.
[3] Not classified according to the 1938 system.
[4] Maryland is outside the range of the St. Johns series, which has recently been reclassified and in the future may be given another name.

Families: Families are separated within a subgroup on the basis of properties important to the growth of plants or behavior of soils where used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence. A family name consists of a series of adjectives, and these are the class names for texture, mineralogy, and so on, that are used as family differentiae.

Series: The series consists of a group of soils that formed from a particular kind of parent material and that have genetic horizons that, except for texture of the surface soil, are similar in differentiating characteristics and in arrangement in the profile. Among these characteristics are color, structure, reaction, consistence, and mineralogical and chemical composition.

General Nature of the County

This section is mainly provided for those who are not familiar with the county. It describes the geology, relief, and drainage of the county and also describes the water supply and the vegetation. Then it discusses the settlement and development of the country and gives facts about the farming.

Geology, Relief, and Drainage

Worcester County lies in the physiographic province called the Atlantic Coastal Plain and is about 110 miles east of the fall line that separates the plain from the Piedmont Plateau. The soils of the county are underlain by sediment consisting chiefly of gravel, silt, clay, sand, and shell fragments. The sediment is relatively unconsolidated and generally is more than 1 mile thick, though that under Ocean City is more than 8,500 feet thick. Beneath the sediment is crystalline rock that dips to the southeast at a rate of about 150 feet per mile. Similarly most of the overlying sediment dips to the southeast at a rate of 10 to 73 feet per mile. The sediment was deposited mainly in a marine or shallow-water environment, and this accounts for its dominantly gray or white color. The sediment most likely originated in the Appalachian Mountains and the Piedmont Plateau.

The county is a low, eroded plain, where differences in relief are slight. Although it appears to be monotonously level, the county actually included terraces, stream channels, drowned valleys, basinlike depressions, remnant dunes, swamps, and marshes. The terraces were laid down by meltwater from the continental ice mass; they are evidence that the level of the sea was higher in recent geologic time than it is today.

The three main physiographic divisions of the county are the mainland, the Coastal beaches, and the Tidal marshes. All of the farmland is on the mainland, where the soils generally are level to gently undulating, except for large level areas in the central and northern parts of the county. Many areas of the mainland are a few feet above the normal level of the streams, and in places they are adjacent to marshland. Many low swales surrounded by ridges make some parts of the mainland appear hummocky. In places the swales contain basins that are known locally as "whale wallows" or "Maryland basins."

The low Coastal beaches are mainly on reefs or barrier islands. The islands range from a few hundred feet to about a mile in width and extend the entire length of the county along the Atlantic Ocean.

The Tidal marshes are mainly along the mainland, but a few large areas are in the southern and western parts of the county and on the bay side of the Coastal beaches.

Large areas of Muck also are in the county. These areas are in the western and southwestern parts of the county along the Pocomoke River and Nassawango and Dividing Creeks and along small streams throughout the county. There are some small areas of muck along small streams in the county.

Most of the county is less than 40 feet above sea level, except for an area west of Whiton. The highest elevation is 57 feet, and the average elevation is about 35 feet.

Dunes occur at all elevations in the county. All are capped by sand. The material that makes up the dunes, however, ranges from mostly sand to silt and clay.

All of the county is drained by streams that flow in a general southeasterly direction into tidewater embayments and then into the Atlantic Ocean. Most of the county is in the Pocomoke River Basin. This river crosses the county in a southerly and southwesterly direction and flows into the Chesapeake Bay. The Pocomoke River falls about 16 feet in its course throughout the county, and its flow is sluggish. Its tributaries have already reached base level and are even more sluggish (*9*).

Drainage is impeded in almost 75 percent of the acreage of soils of the county. About 6 percent of the soils in the county are Tidal marsh, about 4 percent are Muck, and nearly 2 percent are Coastal beaches. About 20 percent of the soils in the county can be farmed without artificial drainage.

Water Supply

Worcester County has abundant ground water available for development. Generally depth to the water table is less than 25 feet and is within the limit of lift by suction pumps. It is estimated that 360 million gallons of water a day is available from water-bearing beds within the uppermost 500 feet in Worcester, Somerset, and Wicomico Counties. This is almost 30 times as much as the current use, which is estimated at 12.4 million gallons a day. Many more gallons of mineralized water are available for restricted use or for general purposes after treatment (*4*).

Most of the wells in the county are shallow. The water in the wells is obtained from sediment of the Pleistocene and Pliocene series, though water for towns comes mainly from the Pocomoke and Manokin aquifers. The intake belt for the Pocomoke aquifer runs in a northeasterly direction from Crisfield and through Westover to Pittsville. The intake belt for the Manokin aquifer is in a wide area that begins below Nanticoke and runs north-northeast under Hebron and into Delaware. Records of one of the wells that supplies water for Snow Hill show that the Pocomoke aquifer is 15 feet thick and is at a depth of 143 feet. The Manokin aquifer, from which Snow Hill pumps its water, is 33 feet thick and is at a depth of 372 feet.

The quality of ground water in the county varies, according to the composition of the formations through which it moves and the conditions in the recharge area. Little bacteria contaminates the artesian water but the amount of dissolved mineral matter is high in places.

Most of the shallow wells in the county provide soft acid water that tastes of iron. Water in the well that supplies Snow Hill, however, is alkaline in reaction, and it is moderately soft and contains little iron.

Relief, through its effect on runoff, influences the amount of moisture that soaks into the ground and is held in the soil and the discharge of ground water by evapotranspiration. Most of the ground water comes from rain that filters through the soil or seeps in from streams, lakes, or ponds that recharge the ground-water reservoirs. The percentage of precipitation that recharges the ground water is highest in winter and lowest late in summer and early in fall. During the growing season, much of the rainfall is used by plants and is returned to the atmosphere through evapotranspiration. In winter most plants are dormant, and any rain that falls runs off or soaks into the ground. About 51 percent of the total rainfall enters the soils and the rest drains away. About half of the annual rainfall, which amounts to about 49 inches at Snow Hill, is lost through evapotranspiration.

Vegetation

Hardwoods probably once covered all of the county except for Tidal marsh and Coastal beaches. Oaks were dominant in most areas, though the particular species in an area depended mostly on the drainage. Other important trees in the stands were swamp maple, sweetgum, holly, beech, white-cedar, and baldcypress.

Loblolly pine encroaches in many abandoned or heavily cutover areas, and shortleaf pine and Virginia pine encroach where the soils are coarse textured and droughty. Loblolly pine is dominant in areas that are heavily cutover, in fields of better soils, and where drainage is impeded. Fairly pure stands of loblolly pine grow in many areas that formerly were cultivated. Tidal marsh has a cover chiefly of grasses and rushes, but a few shrubs and small trees that tolerate salt water or brackish water also grow on the areas.

Climate [5]

Worcester County has a humid continental climate modified by its nearness to large areas of water. The general atmospheric flow is from west to east, but alternating high and low pressure systems dominate in the colder half of the year and cause much of the variety in the daily weather. High pressure systems normally bring westerly to northwesterly winds, cooler temperatures, and clearing weather. Low pressure systems bring southerly and easterly winds, warmer temperatures, cloudiness, and rain or snow according to the season. This pattern tends to break down in summer, however, as warm moist air spreads northward from the south and southwest and remains over the area much of the time.

The Atlantic Ocean and the Chesapeake Bay modify masses of air that pass over them before reaching the county. In winter air from off the ocean, associated with a low pressure system, causes the temperature to rise and occasionally brings large amounts of precipitation. In summer winds from the ocean lower the temperature, particularly in the immediate coastal areas.

Worcester County is in the Coastal Plain of Maryland, where the relief generally is level or gently sloping. Elevation ranges from sea level to less than 60 feet. Except for the coastal areas where the maritime effect is most pronounced, the variation in climate generally is small.

Table 10 shows the temperature and precipitation at Snow Hill. The temperatures shown are representative of the county, though minor variations occur in the coastal areas. The average annual temperature at Snow Hill is 56.7° F. Ocean City, which is representative of the coastal areas, has about the same annual temperature, but daily and maximum temperatures for the year average nearly 3 degrees lower and daily minimum temperatures about 3.5 degrees higher. The last half of July is the hottest part of the year. A temperature exceeding 100°, however, has been recorded in Snow Hill on only about 15 days. The coldest period is the latter part of January and the early part of February, but a temperature of zero or lower has been recorded only 27 times at Snow Hill.

The probabilities of freezing temperatures at Snow Hill on or after given dates in spring and on or before given dates in fall are shown in table 11. The period between the last frost or 32° F. in spring and the first in fall, generally defined as the growing season, usually is 183 days in the county. It extends from the last week of April to the last week of October. Throughout the county, however, the growing season varies. It ranges from as much as 200 days in the tidal areas to as little as 180 days in other areas.

The average annual precipitation at Snow Hill is about 49 inches, which is the highest average in the county. The only other station in the county that has such a long record as Snow Hill is the one at Pocomoke City, but here the average annual precipitation is 41.34 inches. Precipitation at Pocomoke City is quite well distributed throughout the year, however, with the heaviest monthly totals in July and August.

Most precipitation during the colder half of the year is the result of low-pressure storms that cover large areas and sometimes last for several days. In summer most precipitation occurs in showers and thunderstorms. These storms may provide heavy rain in one small area and only a small amount in a nearby area, or may miss some areas entirely.

Heavy precipitation is most likely to occur in the warmer half of the year when thunderstorm activity is most pronounced. A total of 7.3 inches of rain, the heaviest in 1 day, fell during a tropical storm that struck Snow Hill on September 8, 1934. On the average, as much as 2.75 inches of rain in 1 hour can be expected once every 10 years at Snow Hill, and as much as 3.75 inches in 1 hour every 100 years.

Drought may occur at any time of the year, but a serious drought affecting farm crops is most likely in summer. Generally the rainfall and the moisture stored in the soil are adequate for favorable growth of crops. At times, however, showers are unevenly distributed in summer, and dry periods occur at critical stages of plant growth. At such times evaporation also is high. No official measurements of evaporation have been made in the county, but the estimated average class A pan evaporation in the county for the period of May to October is about 33 inches.

[5] By W. J. Moyer, State climatologist, National Weather Service, ESSA, U.S. Department of Commerce.

TABLE 10.—*Temperature and*

[Elevation

Month	Temperature [1]									Precipitation		
	Average			Extremes				Two years in 10, month will have at least 4 days with—		Average	Greatest daily	Year
	Daily maximum	Daily minimum	Monthly	Highest on record	Year	Lowest on record	Year	Maximum temperature equal to or higher than [2]—	Minimum temperature equal to or lower than [2]—			
	° F.	° F.	° F.	° F.		° F.		° F.	° F.	Inches	Inches	
January	47.9	28.3	38.1	76	1950	−11	1942	65	9	3.94	3.42	1944
February	49.1	28.3	38.7	80	1930	−5	1934	64	15	3.43	2.88	1920
March	55.5	33.8	44.7	89	1945	6	1934	72	21	4.62	4.77	1942
April	66.1	43.0	54.6	92	[3] 1960	16	1923	83	30	3.61	3.00	1937
May	76.0	52.2	64.1	97	1942	27	1943	89	39	3.61	2.50	1940
June	84.0	61.2	72.6	100	1945	38	1938	94	50	3.80	4.32	1962
July	87.3	65.9	76.6	101	[3] 1953	46	1940	96	55	5.12	6.75	1922
August	85.9	64.5	75.2	102	1932	43	1941	94	52	5.67	5.30	1964
September	80.4	58.2	69.3	103	1932	34	[3] 1935	91	44	4.50	7.30	1934
October	70.7	47.1	58.9	97	1941	23	1928	84	34	3.91	4.94	1960
November	59.8	36.7	48.3	84	1950	8	1929	75	23	3.55	2.48	1952
December	49.8	28.8	39.3	74	1956	−2	[3] 1958	66	14	3.41	2.80	1945
Year	67.7	45.7	56.7	103	1932	−11	1942			49.17	7.30	1934

[1] Averages for the period 1931–60; extremes for the period March 1916 to December 1966; April 1930 through November 1931 missing.
[2] For the period 1940–60.
[3] Also in earlier months or years.

The average annual snowfall at Snow Hill is 11.7 inches, but the annual total varies from year to year. Only a trace of snow fell in the winter of 1948–49, but 41 inches of snow was measured in the winter of 1935–36. The greatest one-day snowfall occurred on February 7, 1936 and amounted to 17 inches. The greatest depth of snow on the ground at any one time was 22 inches, recorded on January 30, 1966.

Thunderstorms occur on an average of about 30 days per year, and two-thirds of these storms occur in June, July, and August. Occasionally crops and property are damaged by lightning, wind, hail, or flooding. Hail falls in such storms only once or twice a year, generally in the period from May through August.

Tornadoes seldom occur and have caused little damage. The effects of tropical storms or hurricanes are felt about once a year, generally in August or September. Most of

TABLE 11.—*Probable dates of last specified freezing temperatures in spring and first in fall*

[Data from Snow Hill, Worcester County, Md.]

Probability	Dates for given probability and temperature		
	32° or lower	24° or lower	16° or lower
Spring:			
9 years in 10 later than	April 9	March 3	January 29
3 years in 4 later than	April 16	March 12	February 7
2 years in 3 later than	April 19	March 15	February 11
1 year in 2 later than	April 24	March 21	February 18
1 year in 3 later than	April 29	March 27	February 25
1 year in 4 later than	May 2	March 30	March 1
1 year in 10 later than	May 9	April 8	March 10
Fall:			
1 year in 10 earlier than	October 11	November 1	November 26
1 year in 4 earlier than	October 17	November 8	December 3
1 year in 3 earlier than	October 20	November 11	December 5
1 year in 2 earlier than	October 24	November 16	December 10
2 years in 3 earlier than	October 28	November 21	December 15
3 years in 4 earlier than	October 31	November 24	December 17
9 years in 10 earlier than	November 6	December 1	December 24

precipitation at Snow Hill, Md.

14 feet]

Precipitation—Continued							Average number of days with—				
One year in 10, month will have—		Snow, sleet					Precipitation of 0.10 inch or more	Temperature			
								Maximum		Minimum	
Less than—	More than—	Average	Maximum monthly	Year	Greatest daily	Year		90° and above	32° and below	32° and below	0° and below
Inches	*Inches*	*Inches*	*Inches*		*Inches*						
1. 9	6. 4	3. 3	28. 5	1966	14. 1	1940	8	0	3	20	1
1. 7	5. 3	3. 0	19. 0	1936	17. 0	1936	7	0	1	19	[4]
2. 3	7. 6	2. 9	15. 5	1960	10. 0	1960	9	0	[4]	16	0
2. 2	5. 5	. 1	2. 0	1964	2. 0	1964	7	[4]	0	5	0
1. 5	6. 6	0	0	--------	0	--------	7	1	0	[4]	0
1. 2	6. 7	0	0	--------	0	--------	7	8	0	0	0
2. 4	11. 0	0	0	--------	0	--------	8	11	0	0	0
2. 8	12. 0	0	0	--------	0	--------	7	9	0	0	
1. 0	8. 2	0	0	--------	0	--------	6	3	0	0	0
1. 3	7. 2	[5]	[5]	[2] 1963	[5]	[2] 1963	6	[4]	0	2	0
. 9	5. 7	. 2	4. 0	1938	3. 0	[2] 1938	6	0	0	12	0
1. 5	5. 5	2. 2	20. 0	1935	8. 0	1958	6	0	2	21	[4]
40. 4	57. 2	11. 7	28. 5	1966	17. 0	1936	84	32	6	95	1

[4] Less than one-half day.
[5] Trace, an amount too small to measure.

these storms cause only minor damage in the county, and the rain they bring benefits crops.

The prevailing wind is from the west to northwest, except in summer when it is southerly. The average wind velocity is 8 to 10 miles per hour, but winds of 50 to 60 miles per hour, or more, sometimes accompany severe thunderstorms or hurricanes in summer or in general winter storms. The critical period for soil blowing is late in winter and early in spring when the average duration and velocity of the wind are greatest. Sand blown by high winds cuts young plants that are not protected and removes organic matter, a valuable part of sandy soils.

Relative humidity generally is lowest in February, March, and April and is highest in July, August, and September. The humidity varies during the day and normally is highest near sunrise. The range at this hour is from about 85 percent late in summer and early in fall to about 75 percent late in winter and early in spring. In the afternoon, humidity generally ranges from about 50 to 55 percent in summer to nearly 60 percent in winter.

Normally the county receives sunshine about 60 percent of the maximum time possible in the year, but the range is 55 percent in winter to about 65 percent in summer.

Settlement and Development

Settlement of the area that is now Worcester County began early in the 17th century. The first settlers came mainly from England, but some also came from Virginia and from Delaware. The area was not organized as a county until 1742. It was formed from a part of Somerset County and named for the Earl of Worcester (*13*). Later the northwestern part of Worcester County became part of Wicomoco County.

Snow Hill, the county seat, was founded in about 1640 by English settlers who named it for their hometown near London. The site provided the settlers with a harbor at the northernmost navigable point of the Pocomoke River and gave them a convenient location for shipping. Three shipyards were established at Pocomoke City, which was originally called Newtown. These yards made use of cypress timber along the Pocomoke River. In 1970, according to the U.S. Census, the county had a population of 23,826, and most of the people lived in rural areas.

The economy in the county is based mainly on farming, but some people find employment in industries, many of which are closely related to farming and to the natural resources in the county. The county has large plants that manufacture poultry feed from corn and soybeans grown in the area. Also, facilities for processing poultry and for selling and distributing other farm products and seafood are available. In addition the county has a rapidly expanding tourist and resort trade that gives employment to many. Growth of this industry was accelerated by the opening of the Chesapeake Bay Bridge, which gave quick access to Ocean City, the only beach resort in Maryland, as well as to other parts of the county.

In colonial days transportation was mainly by water, and all settlements were on or near navigable bodies of water. Small tankers, as well as carriers of fertilizer and other cargo, still use the docking facilities in Pocomoke City and Snow Hill.

Two lines of the Pennsylvania Railroad serve the county, though much of the shipping is done by truck. Modern

highways cross the county in all directions, and most roads are hard surfaced. U.S. Highway 50 traverses the county from east to west and terminates at Ocean City. Crossing from the north-central part of the county to the southwestern part is U.S. Highway 113 which joins U.S. Highway 13 at Pocomoke City. In addition State Highway 12 provides a direct connection between Snow Hill and Salisbury. These highways make markets in Wilmington, Philadelphia, New York, and other cities readily available to farmers, and they can be reached in 3 to 12 hours. Markets south and west of Chesapeake Bay are now easily accessible by way of the Chesapeake Bay Bridge.

Farming

Farming is important in Worcester County and is the basis of much of the industry. In the paragraphs that follow, information about the farms in the county is given. The statistics used are mainly from the U.S. Bureau of the Census, though some are from the Comparative Census of Maryland Agriculture by Counties, and some are from the 1924 Soil Survey of Worcester County (*9*).

According to the Census of Agriculture, slightly more than 45 percent of the total acreage in Worcester County was in farms in 1964. Of this, 69,179 acres were used as cropland, 5,939 were in pasture, and 48,432 acres were in woodlots and other farm uses. The county had 191,400 acres of forest in 1965, according to the Maryland Department of Forests and Parks.

Farms in the county have decreased in number but have increased in size. In 1964 there were 824 farms, a decrease of about 30 percent since 1950, and of about 58 percent since 1900. The size of the average farm, however, increased from 121.5 acres in 1900 to 169.6 acres in 1964.

The production of broilers is the main farm enterprise. In 1964, the broilers sold amounted to 30,506,928, and other chickens amounted to 99,600. In addition turkeys were raised on a few farms. Only a small part of the farm income came from other livestock and from dairy products in 1964. In that year there were only 13 dairy farms and 11,750 hogs reported in the county.

Corn and soybeans are the principal crops. They are used chiefly as food for broilers, though some of the grain is eaten in the field by hogs. The acreage in corn increased by about 9 percent between 1959 and 1964. Yield per acre increased from 51 bushels in 1959 to 73 bushels in 1964. Table 12 gives the acreage of the most important crops grown in the county in 1964.

Before the Revolutionary War, the most important crops in the area that is now Worcester County were corn and tobacco. Tobacco has not been grown in the county since 1955, but corn has always remained an important crop. The only other crop grown for grain is rye, but much of the rye planted in the county is used as a cover crop in fields where soils are subject to blowing. Tree fruit provided an important part of the farm income around 1900, when apples, peaches, and pears were raised for market. Grapes also were raised in quantity. In 1919 a large peach and apple nursery was in the county near Berlin. In 1964, however, apples were sold from only a few farms, and 3,633 peach trees were reported on the farms. Potatoes were an important crop as early as 1899, and both white potatoes and sweetpotatoes were grown. Truck crops and nursery and greenhouse products have been an important

TABLE 12.—*Acreage of principal crops in 1964*

Crop	Acres
Corn harvested for grain	34, 312
Soybeans	26, 504
Rye	1, 320
Vegetables harvested:	
Tomatoes	1, 181
Lima beans	681
Green peas	670
Snap beans	525
Irish potatoes	510
Sweetpotatoes	366
Cucumbers	175
Strawberries	52

source of income for many years, and they continue to be a major source of income.

Most farms in the county were operated by owners or part owners in 1964, but 8.1 percent were operated by tenants. Most of the tenants rented the farms.

In 1964, 1,390 tractors were reported on 672 farms. Grain combines and corn pickers are in common use throughout the county, and the number of self-propelled combines, corn dryers, and storage tanks has increased in recent years. Because fields now generally are larger than in the past, large tractors and other large farming equipment are more commonly used.

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Glossary

Acidity, soil. (See Reaction, soil.)

Aeration, soil. The exchange of air in a soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere, but that in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as crumbs, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available water capacity (also termed available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

Chroma. (See Color, Munsell notation.)

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Color, Munsell notation. A system for designating color by degrees of three simple variables—hue, value, and chroma. For example, the color notation 10YR 6/4 stands for a color with hue of 10YR, a value of 6, and a chroma of 4. Hue is the dominant spectral color; value relates to the relative lightness or darkness of color; and chroma is the relative purity of strength of color and increases as grayness decreases.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Contour farming. Plowing, cultivating, planting, and harvesting in rows that are at right angles to the natural direction of slope or that are parallel to the grade.

Cover crop. A close-growing crop grown primarily to improve and to protect the soils between periods of regular crop production; or a crop grown between trees and vines in orchards and vineyards.

Drainage class (natural). Refers to the conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven different classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low water-holding capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and have mottling in the lower B and the C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time, and in Podzolic soils commonly have mottlings below 6 to 16 inches, in the lower A horizon and in the B and C horizons.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Erosion. The wearing away of the land surface by wind (sandblast), running water, and other geological agents.

Fallow. Cropland left idle in order to restore productivity, mainly through accumulation of water, nutrients, or both. Summer fallow is a common stage before cereal grain in regions of limited rainfall. The soil is tilled for at least one growing season to control weeds, to aid decomposition of plant residues, and to encourage the storage of moisture for the succeeding grain crop.

Fertility, soil. The quality of a soil that enables it to provide compounds, in adequate amounts and in proper balance, for the growth of specified plants, when other growth factors such as light, moisture, temperature, and the physical condition of the soil are favorable.

Flood plain. Nearly level land, consisting of stream sediments, that borders a stream and is subject to flooding unless protected artificially.

Fragipan. A loamy, brittle, subsurface horizon that is very low in organic matter and clay but is rich in silt or very fine sand. The layer is seemingly cemented. When dry, it is hard or very hard and has a high bulk density in comparison with the horizon or horizons above it. When moist, the fragipan tends to rupture suddenly if pressure is applied, rather than to deform slowly. The layer is generally mottled, is slowly or very slowly permeable to water, and has few or many bleached fracture planes that form polygons. Fragipans are a few inches to several feet thick; they generally occur below the B horizon, 15 to 40 inches below the surface.

Green manure. A crop grown for the purpose of being turned under in an early stage of maturity or soon after maturity for soil improvement.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material may be sandy or clayey, and it may be cemented by iron oxide, silica, calcium carbonate, or other substance.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O Horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Hue. (See Color, Munsell notation.)

Internal soil drainage. The downward movement of water through the soil profile. The rate of movement is determined by the texture, structure, and other characteristics of the soil profile and underlying layers, and by the height of the water table, either permanent or perched. Relative terms for expressing internal drainage are *none, very slow, slow, medium, rapid,* and *very rapid.*

Leaching. The removal of soluble soil materials from soils or other material by percolating water.

Marine deposit. Material deposited in the waters of oceans and seas and exposed by the elevation of the land or the lowering of the water level.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineralogical, and biological properties of the various horizons, and their thickness and arrangement in the soil profile.

Mottling, soil. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few, common,* and *many,* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct* and *prominent.* The size measurements are these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 and 0.6 inch) in diameter along the greatest dimensions; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Munsell notation. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in the production of food and tissue. Nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil and carbon, hydrogen, and oxygen obtained largely from the air and water, are plant nutrients.

Parent material. Disintegrated and partly weathered rock from which soil has formed.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Permeability. The quality of a soil horizon that enables water or air to move through it. Terms used to describe permeability are as follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

pH value. A numerical means for designating relatively weak acidity and alkalinity in soils. A pH value of 7.0 indicates precise neutrality; a higher value, alkalinity; and a lower value, acidity.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Sand. Individual rock or mineral fragments in soils having diameters ranging from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Stripcropping. Growing crops in a systematic arrangement of strips, or bands, to serve as vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. Technically the part of the soil below the solum.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth, soil. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Upland (geology). Land consisting of material unworked by water in recent geologic time and lying, in general, at a higher elevation than the alluvial plain or stream terrace. Land above the lowlands along rivers.

Value. (See Color, Munsell notation.)

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

Wilting point (or permanent wilting point). The moisture content of soil, on an oven-dry basis, at which plants (specifically sunflower) wilt so much that they do not recover when placed in a dark, humid atmosphere.

GUIDE TO MAPPING UNITS

[For a full description of a mapping unit, read both the description of the mapping unit and that of the soil series to which it belongs. In referring to a capability unit, or a woodland suitability group, read the introduction to the section it is in for general information about its management. Absence of a number for a capability unit or a woodland suitability group indicates that the mapping unit was not placed in a group. Other information is given in tables as follows:]

Acreage and extent, table 1, p. 9.
Suitability of the soils for wildlife habitat, table 3, p. 40.

Engineering uses of the soils, tables 4, 5, and 6, pp. 44 through 59.
Information on town and country planning, tables 7 and 8, pp. 60 through 68.

Map symbol	Mapping unit	Described on page	Capability unit		Woodland suitability group	
			Symbol	Page	Number	Page
CbB	Coastal beaches, 0 to 5 percent slopes	10	VIIIs-2	32	6s21	39
CbC	Coastal beaches, 5 to 10 percent slopes	10	VIIIs-2	32	6s21	39
Ek	Elkton sandy loam	11	IIIw-11	31	3w13	39
El	Elkton loam	11	IIIw-9	31	3w13	39
Em	Elkton silt loam	11	IIIw-9	31	3w13	39
Fa	Fallsington sandy loam	12	IIIw-6	31	2w7	38
Fg	Fallsington loam	12	IIIw-7	31	2w7	38
FmA	Fort Mott loamy sand, 0 to 2 percent slopes	13	IIs-4	30	3o10	38
FmB	Fort Mott loamy sand, 2 to 5 percent slopes	13	IIs-4	30	3o10	38
FmC	Fort Mott loamy sand, 5 to 10 percent slopes	13	IIIe-33	30	3o10	38
FmC3	Fort Mott loamy sand, 5 to 10 percent slopes, severely eroded	13	IVe-5	32	3o10	38
FmD	Fort Mott loamy sand, 10 to 15 percent slopes	13	IVe-5	32	3o10	38
Gb	Gravel and borrow pits	13	VIIIs-4	33	----	--
KsA	Klej loamy sand, 0 to 2 percent slopes	14	IIIw-10	31	3s13	38
KsB	Klej loamy sand, 2 to 5 percent slopes	14	IIIw-10	31	3s13	38
LaD	Lakeland sand, 5 to 15 percent slopes	15	VIIs-1	32	3s14	39
LkD	Lakeland loamy sand, 5 to 15 percent slopes	15	VIIs-1	32	3s14	39
LkE	Lakeland loamy sand, 15 to 30 percent slopes	15	VIIs-1	32	3s15	39
LlB	Lakeland sand, clayey substratum, 0 to 5 percent slopes	15	IVs-1	32	3s14	39
LmB	Lakeland loamy sand, clayey substratum, 0 to 5 percent slopes	15	IIIs-1	31	3s14	39
LoB	Lakeland-Fort Mott loamy sands, 0 to 5 percent slopes	16	IIIs-1	31	3s14	39
LoC	Lakeland-Fort Mott loamy sands, 5 to 10 percent slopes	16	IVs-1	32	3s14	39
Ls	Leon loamy sand	16	Vw-5	32	2w7	38
Ma	Made land 1/	17	-------	--	----	--
MdA	Matapeake fine sandy loam, 0 to 2 percent slopes	17	I-5	29	3o10	38
MdB	Matapeake fine sandy loam, 2 to 5 percent slopes	17	IIe-5	29	3o10	38
MdC	Matapeake fine sandy loam, 5 to 10 percent slopes	17	IIIe-5	30	3o10	38
MeA	Matapeake silt loam, 0 to 2 percent slopes	18	I-4	29	3o10	38
MeB	Matapeake silt loam, 2 to 5 percent slopes	18	IIe-4	29	3o10	38
MeC	Matapeake silt loam, 5 to 10 percent slopes	18	IIIe-4	30	3o10	38
MkC3	Matapeake soils, 5 to 10 percent slopes, severely eroded	18	IVe-3	31	3o10	38
MkD	Matapeake soils, 10 to 15 percent slopes	18	IVe-3	31	3o10	38
MkE	Matapeake soils, 15 to 30 percent slopes	18	VIe-2	32	3r10	38
MoA	Mattapex fine sandy loam, 0 to 2 percent slopes	19	IIw-5	30	3o13	38
MoB	Mattapex fine sandy loam, 2 to 5 percent slopes	19	IIe-36	30	3o13	38
MpA	Mattapex loam, 0 to 2 percent slopes	19	IIw-1	30	3o13	38
MpB	Mattapex loam, 2 to 5 percent slopes	19	IIe-16	29	3o13	38
MtA	Mattapex silt loam, 0 to 2 percent slopes	19	IIw-1	30	3o13	38
MtB	Mattapex silt loam, 2 to 5 percent slopes	19	IIe-16	29	3o13	38
My	Mixed alluvial land	19	VIw-1	32	2w7	38
Mz	Muck	20	IVw-7	32	----	--
Ot	Othello silt loam	21	IIIw-7	31	3w13	39

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Described on page	Capability unit Symbol	Capability unit Page	Woodland suitability group Number	Woodland suitability group Page
Pe	Plummer loamy sand	22	IVw-6	32	2w7	38
Pk	Pocomoke sandy loam	23	IIIw-6	31	2w7	38
Pm	Pocomoke loam	23	IIIw-7	31	2w7	38
Pr	Portsmouth sandy loam	23	IIIw-6	31	2w7	38
Pt	Portsmouth silt loam	24	IIIw-7	31	2w7	38
Ru	Rutlege loamy sand	24	IVw-6	32	3w13	39
SaA	Sassafras sandy loam, 0 to 2 percent slopes	25	I-5	29	3o10	38
SaB2	Sassafras sandy loam, 2 to 5 percent slopes, moderately eroded	25	IIe-5	29	3o10	38
SaC2	Sassafras sandy loam, 5 to 10 percent slopes, moderately eroded	25	IIIe-5	30	3o10	38
SaC3	Sassafras sandy loam, 5 to 10 percent slopes, severely eroded	25	IVe-5	32	3o10	38
SaD	Sassafras sandy loam, 10 to 15 percent slopes	25	IVe-5	32	3o10	38
SaE	Sassafras sandy loam, 15 to 30 percent slopes	25	VIe-2	32	3r10	38
SmA	Sassafras loam, 0 to 2 percent slopes	25	I-4	29	3o10	38
SmB2	Sassafras loam, 2 to 5 percent slopes, moderately eroded	25	IIe-4	29	3o10	38
St	St. Johns loamy sand	26	Vw-5	32	2w7	38
Su	St. Johns mucky loamy sand	26	Vw-5	32	2w7	38
Tm	Tidal marsh	26	VIIIw-1	32	----	--
WdA	Woodstown sandy loam, 0 to 2 percent slopes	28	IIw-5	30	2o5	38
WdB	Woodstown sandy loam, 2 to 5 percent slopes	28	IIe-36	30	2o5	38
WoA	Woodstown loam, 0 to 2 percent slopes	28	IIw-1	30	2o5	38
WoB	Woodstown loam, 2 to 5 percent slopes	28	IIe-16	29	2o5	38

1/ Characteristics too variable to classify.

U.S. DEPARTMENT OF AGRICULTURE

Washington, D.C. 20250

SOIL SURVEY OF

WORCESTER COUNTY, MARYLAND

ERRATA SHEET

Correct grid values on plane coordinate system as follows:

Map Sheet	Location	Change from	Change to
3	Lower Right	1 400 000 FEET	1 340 000 FEET
4	Upper Left	1 405 000 FEET	1 345 000 FEET
	Lower Right	1 420 000 FEET	1 360 000 FEET
7	Lower Right	1 400 000 FEET	1 340 000 FEET
8	Upper Left	1 405 000 FEET	1 345 000 FEET
	Lower Right	1 420 000 FEET	1 360 000 FEET
11	Lower Right	1 400 000 FEET	1 340 000 FEET
12	Upper Left	1 405 000 FEET	1 345 000 FEET
	Lower Right	1 420 000 FEET	1 360 000 FEET
13	Upper Left	1 285 000 FEET	1 275 000 FEET
17	Upper Left	1 405 000 FEET	1 345 000 FEET
17 INSET	Upper Left	1 401 000 FEET	1 341 000 FEET
	Lower Right	1 405 000 FEET	1 345 000 FEET
18 INSET B	Lower Right	124 000 FEET	1 240 000 FEET

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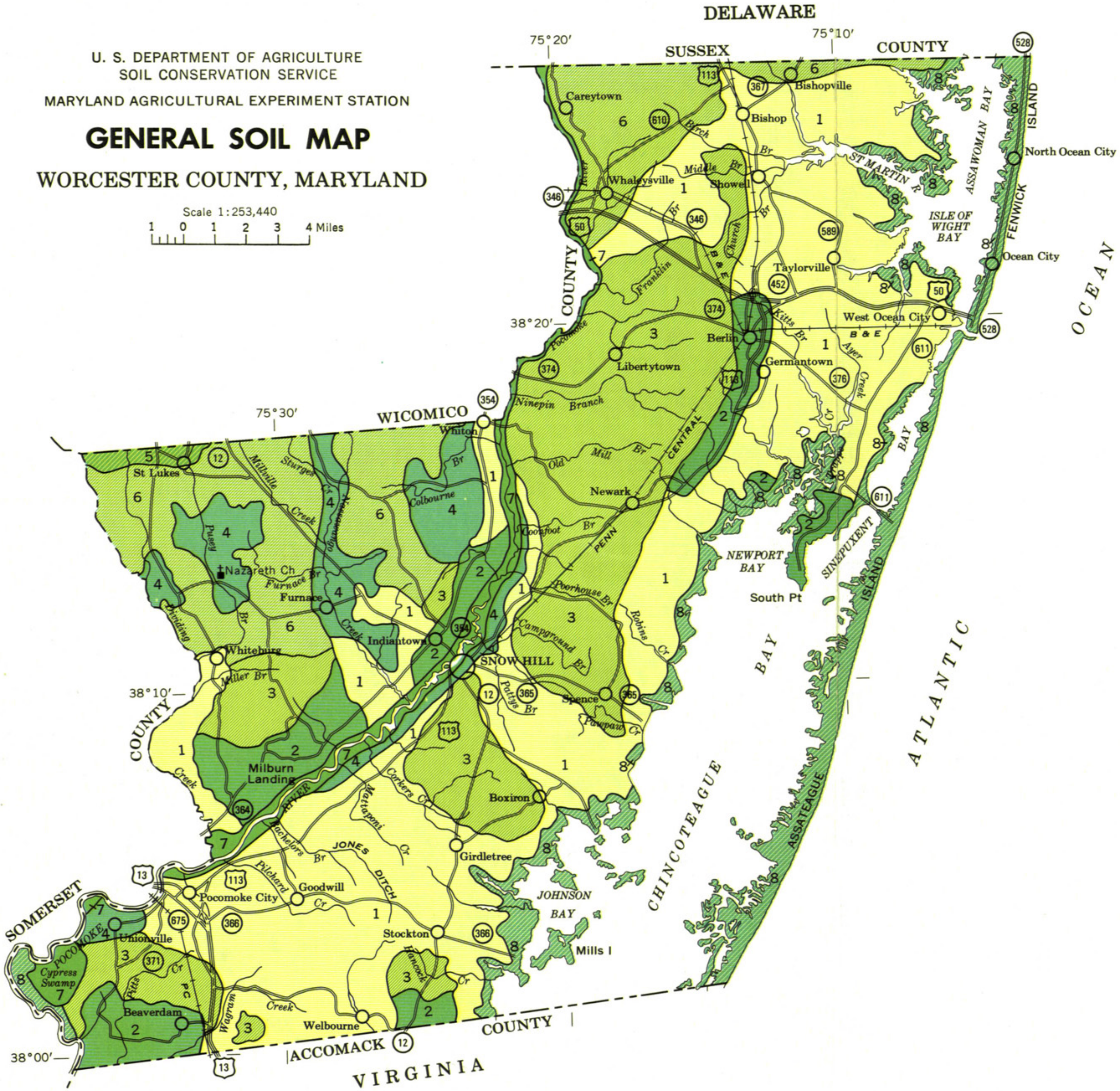
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
MARYLAND AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

WORCESTER COUNTY, MARYLAND

Scale 1:253,440

1 0 1 2 3 4 Miles



SOIL ASSOCIATIONS

1	Fallsington-Woodstown-Sassafras association: Level to steep, poorly drained to well-drained soils that have a subsoil dominantly of sandy clay loam
2	Mattapex-Matapeake-Othello association: Level to steep, well-drained to poorly drained soils that have a subsoil dominantly of silty clay loam
3	Othello-Fallsington-Portsmouth association: Level and nearly level, poorly drained and very poorly drained soils that have a subsoil dominantly of sandy clay loam or silty clay loam
4	Lakeland-Klej-Plummer association: Level to steep, excessively drained to very poorly drained soils that are sand and loamy sand throughout
5	Portsmouth-Mattapex-Elkton association: Level to gently sloping, very poorly drained to moderately well drained soils that have a subsoil dominantly of plastic silty clay or silty clay loam
6	Pocomoke-Rutlege-Plummer association: Level and nearly level, very poorly drained and poorly drained soils that have a subsoil of sandy loam and sandy clay loam or are underlain by loamy sand, sand, or both
7	Muck association: Level, very poorly drained organic soils and alluvial land; subject to intermittent flooding
8	Tidal marsh-Coastal beaches association: Dominantly level and nearly level, saline to brackish sediment; subject to intermittent flooding by tidal water

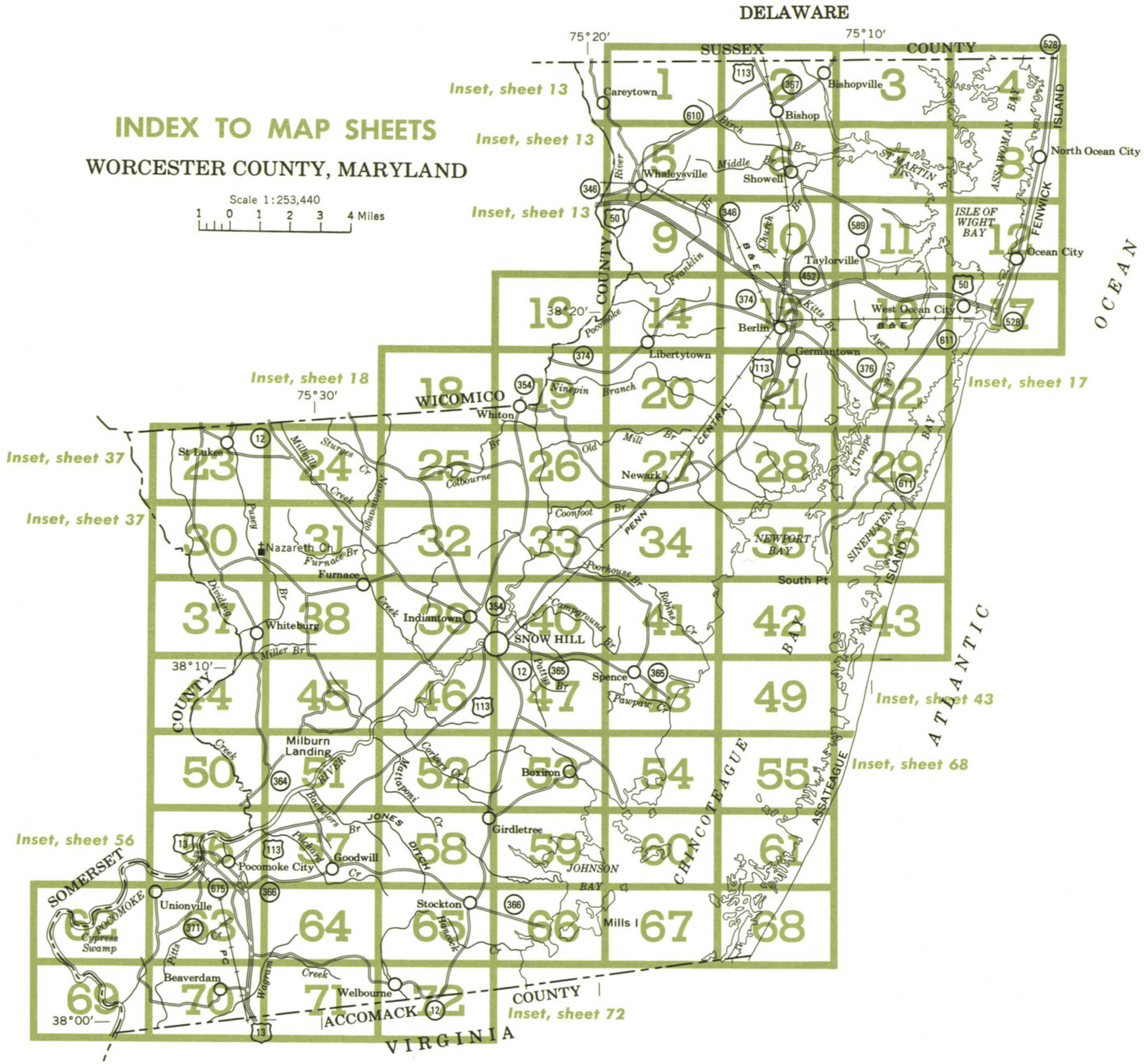
This map is for general planning. It shows only the major soils and does not contain sufficient detail for operational planning.

Published 1971

INDEX TO MAP SHEETS

WORCESTER COUNTY, MARYLAND

Scale 1:253,440



SOIL LEGEND

The first capital letter is the initial one of the soil name. A second capital letter, A, B, C, D, or E, shows the slope. Most symbols without a slope letter are those of nearly level soils or land types, but some are for soils or land types that have a considerable range in slope. The number, 2 or 3, in a symbol indicates that the soil is moderately eroded or severely eroded.

SYMBOL	NAME
CbB	Coastal beaches, 0 to 5 percent slopes
CbC	Coastal beaches, 5 to 10 percent slopes
Ek	Elkton sandy loam
El	Elkton loam
Em	Elkton silt loam
Fa	Fallsington sandy loam
Fg	Fallsington loam
FmA	Fort Mott loamy sand, 0 to 2 percent slopes
FmB	Fort Mott loamy sand, 2 to 5 percent slopes
FmC	Fort Mott loamy sand, 5 to 10 percent slopes
FmC3	Fort Mott loamy sand, 5 to 10 percent slopes, severely eroded
FmD	Fort Mott loamy sand, 10 to 15 percent slopes
Gb	Gravel and borrow pits
KsA	Klej loamy sand, 0 to 2 percent slopes
KsB	Klej loamy sand, 2 to 5 percent slopes
LaD	Lakeland sand, 5 to 15 percent slopes
LkD	Lakeland loamy sand, 5 to 15 percent slopes
LkE	Lakeland loamy sand, 15 to 30 percent slopes
LlB	Lakeland sand, clayey substratum, 0 to 5 percent slopes
LmB	Lakeland loamy sand, clayey substratum, 0 to 5 percent slopes
LoB	Lakeland-Fort Mott loamy sands, 0 to 5 percent slopes
LoC	Lakeland-Fort Mott loamy sands, 5 to 10 percent slopes
Ls	Leon loamy sand
Ma	Made land
MdA	Matapeake fine sandy loam, 0 to 2 percent slopes
MdB	Matapeake fine sandy loam, 2 to 5 percent slopes
MdC	Matapeake fine sandy loam, 5 to 10 percent slopes
MeA	Matapeake silt loam, 0 to 2 percent slopes
MeB	Matapeake silt loam, 2 to 5 percent slopes
MeC	Matapeake silt loam, 5 to 10 percent slopes
MkC3	Matapeake soils, 5 to 10 percent slopes, severely eroded
MkD	Matapeake soils, 10 to 15 percent slopes
MkE	Matapeake soils, 15 to 30 percent slopes
MoA	Mattapex fine sandy loam, 0 to 2 percent slopes
MoB	Mattapex fine sandy loam, 2 to 5 percent slopes
MpA	Mattapex loam, 0 to 2 percent slopes
MpB	Mattapex loam, 2 to 5 percent slopes
MtA	Mattapex silt loam, 0 to 2 percent slopes
MtB	Mattapex silt loam, 2 to 5 percent slopes
My	Mixed alluvial land
Mz	Muck
Ot	Othello silt loam
Pe	Plummer loamy sand
Pk	Pocomoke sandy loam
Pm	Pocomoke loam
Pr	Portsmouth sandy loam
Pt	Portsmouth silt loam
Ru	Rutlege loamy sand
SaA	Sassafras sandy loam, 0 to 2 percent slopes
SaB2	Sassafras sandy loam, 2 to 5 percent slopes, moderately eroded
SaC2	Sassafras sandy loam, 5 to 10 percent slopes, moderately eroded
SaC3	Sassafras sandy loam, 5 to 10 percent slopes, severely eroded
SaD	Sassafras sandy loam, 10 to 15 percent slopes
SaE	Sassafras sandy loam, 15 to 30 percent slopes
SmA	Sassafras loam, 0 to 2 percent slopes
SmB2	Sassafras loam, 2 to 5 percent slopes, moderately eroded
St	St. Johns loamy sand
Su	St. Johns mucky loamy sand
Tm	Tidal marsh
WdA	Woodstown sandy loam, 0 to 2 percent slopes
WdB	Woodstown sandy loam, 2 to 5 percent slopes
WoA	Woodstown loam, 0 to 2 percent slopes
WoB	Woodstown loam, 2 to 5 percent slopes

CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Highways and roads
- Dual
- Good motor
- Poor motor
- Trail

Highway markers
- National Interstate
- U. S.
- State or county

Railroads
- Single track
- Multiple track
- Abandoned

Bridges and crossings
- Road
- Trail
- Railroad
- Ferry (FY)
- Ford (FORD)
- Grade
- R. R. over
- R. R. under

Tunnel

Buildings
- School
- Church

Mine and quarry

Gravel pit

Power line

Pipeline

Cemetery

Dams

Levee

Tanks

Well, oil or gas

Forest fire or lookout station

Windmill

BOUNDARIES

- National or state
- County
- Reservation
- Land grant
- Small park, cemetery, airport

DRAINAGE

Streams, double-line
- Perennial
- Intermittent

Streams, single-line
- Perennial
- Intermittent
  - Crossable with tillage implements
  - Not crossable with tillage implements
  - Unclassified

Canals and ditches (CANAL)

Lakes and ponds
- Perennial (water, w)
- Intermittent (int)

Spring

Marsh or swamp

Wet spot

Alluvial fan

Drainage end

RELIEF

Escarpments
- Bedrock
- Other

Prominent peak

Depressions (Large, Small)
- Crossable with tillage implements
- Not crossable with tillage implements
- Contains water most of the time

SOIL SURVEY DATA

Soil boundary and symbol (Dx)

Gravel

Stoniness
- Stony
- Very stony

Rock outcrops

Chert fragments

Clay spot

Sand spot

Gumbo or scabby spot

Made land

Severely eroded spot

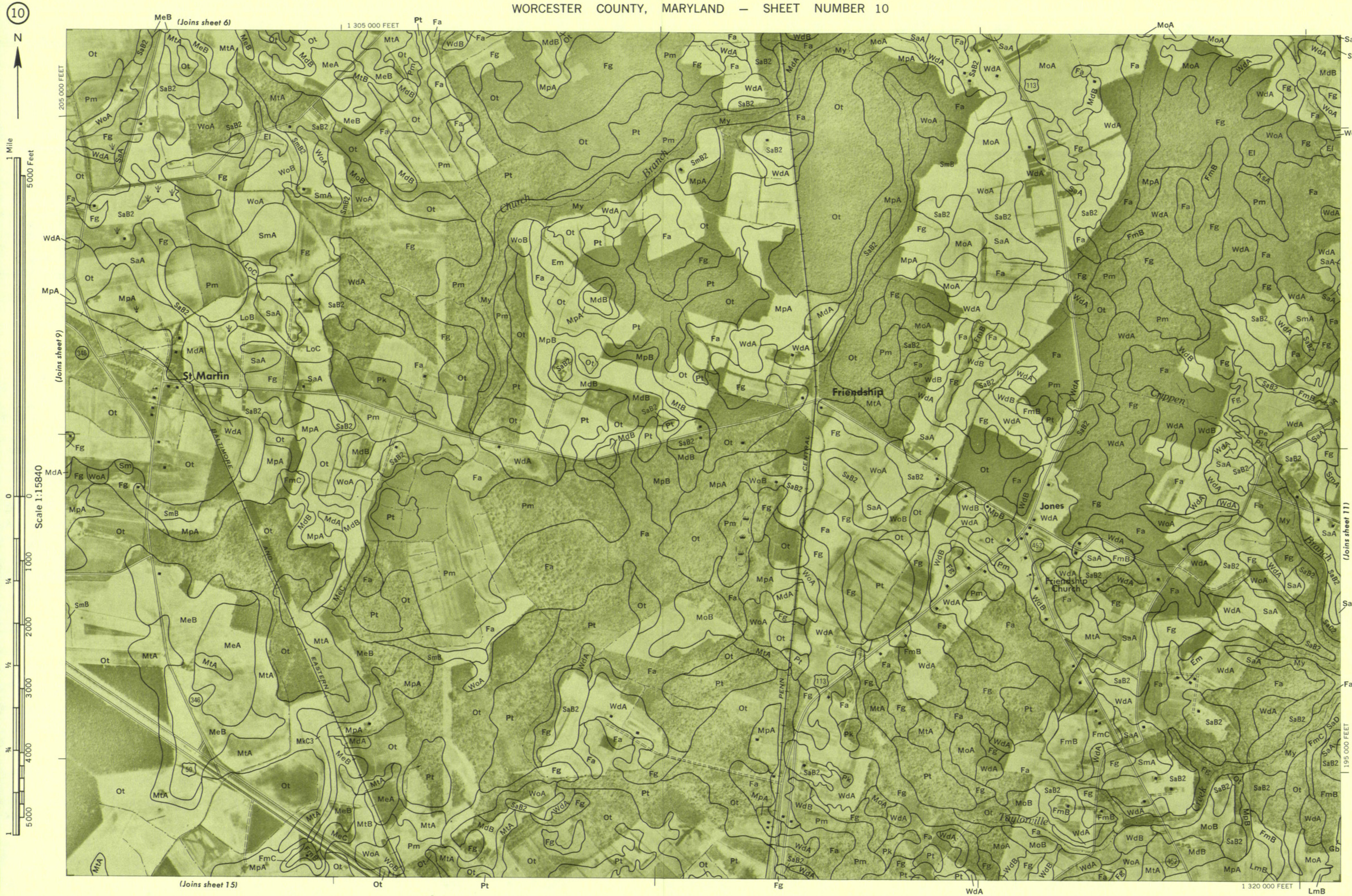
Blowout, wind erosion

Gully

WORCESTER COUNTY, MARYLAND NO. 1

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station. Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system. 1927 North American datum.

WORCESTER COUNTY, MARYLAND — SHEET NUMBER 10



WORCESTER COUNTY, MARYLAND NO. 10

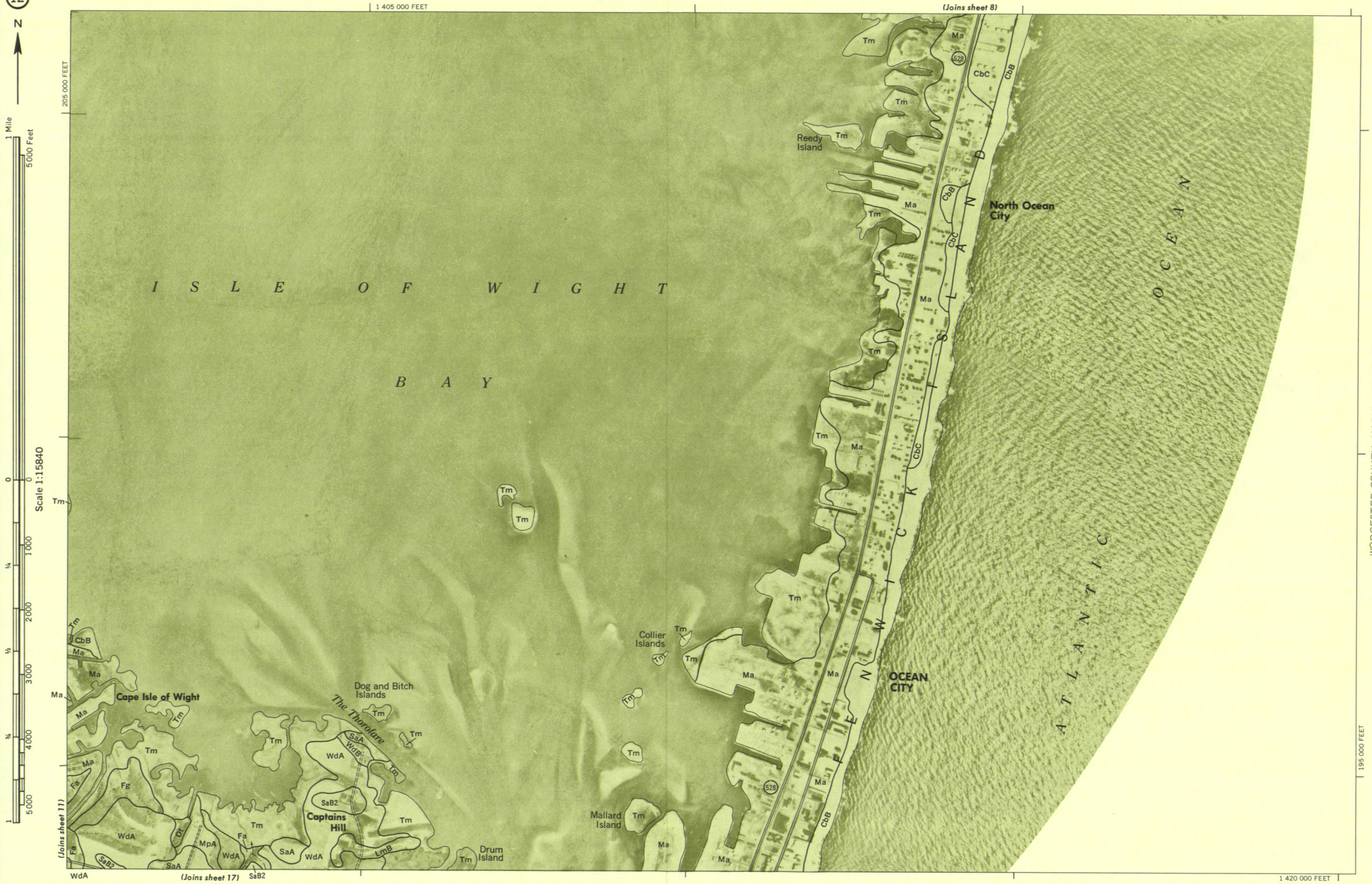
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

WORCESTER COUNTY, MARYLAND — SHEET NUMBER 11

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system 1927 North American datum.

WORCESTER COUNTY, MARYLAND NO. 11



WORCESTER COUNTY, MARYLAND NO. 12

Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system. 1927 North American datum.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

WORCESTER COUNTY, MARYLAND NO. 13

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

WORCESTER COUNTY, MARYLAND — SHEET NUMBER 14

N

1 Mile
5000 Feet
Scale 1:15840
0 1000 2000 3000 4000 5000
0 ¼ ½ ¾ 1

(Joins sheet 15)

WORCESTER COUNTY, MARYLAND NO. 14

Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system. 1927 North American datum.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

N

1 Mile

5000 Feet

0 0

1000

2000

3000

4000

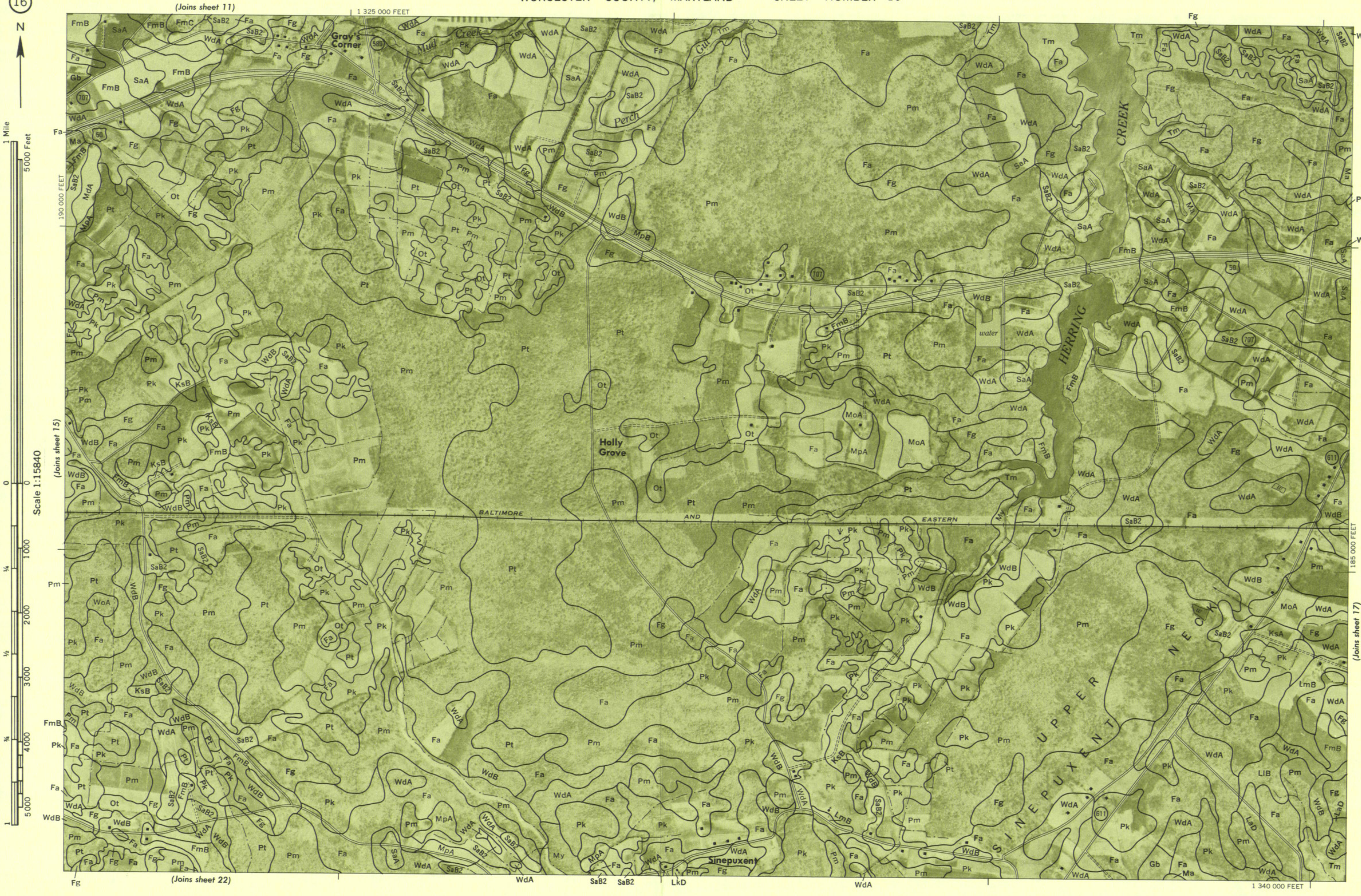
5000

Scale 1:15840

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

WORCESTER COUNTY, MARYLAND NO. 15

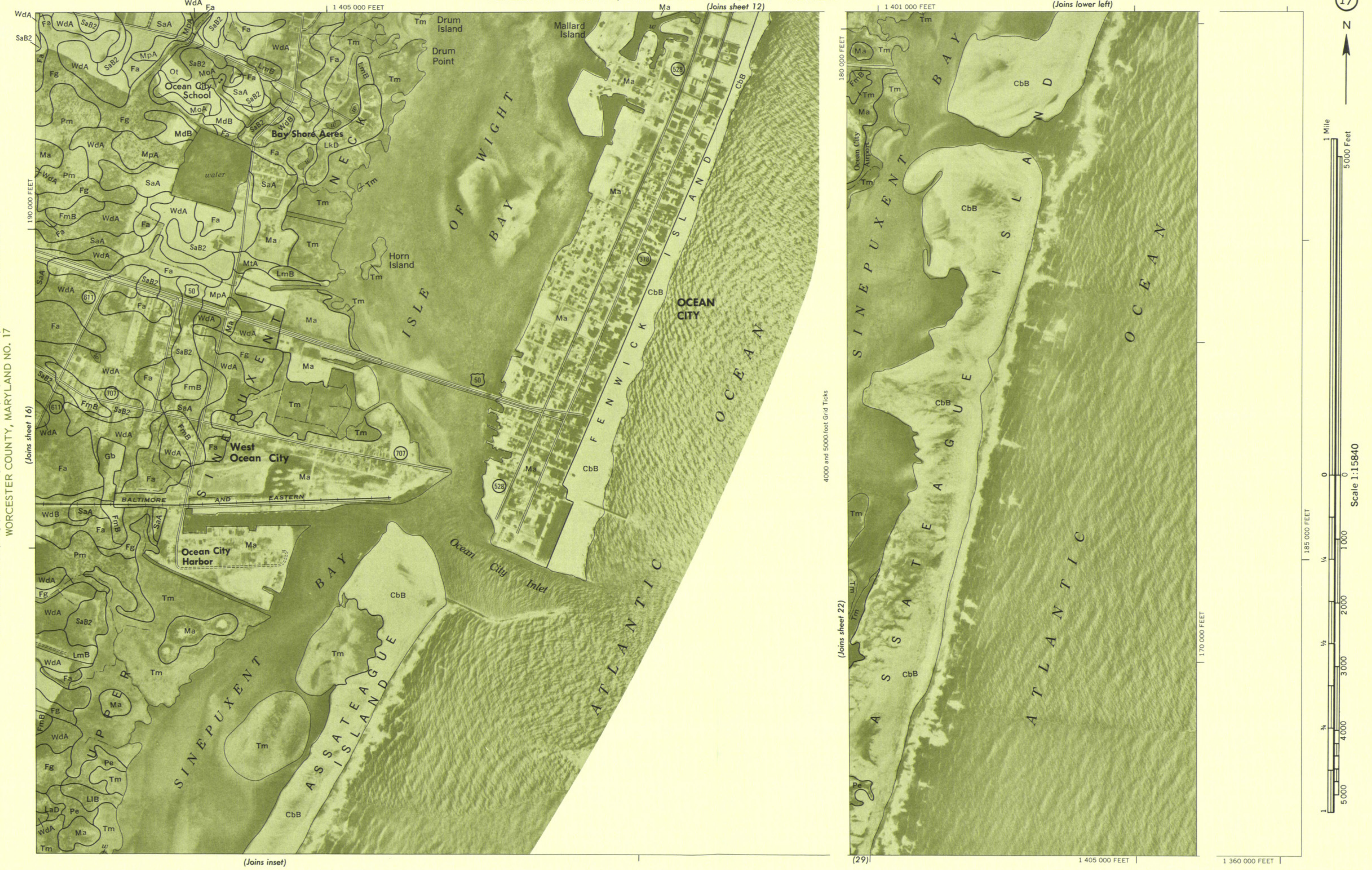
WORCESTER COUNTY, MARYLAND — SHEET NUMBER 16



WORCESTER COUNTY, MARYLAND NO. 16

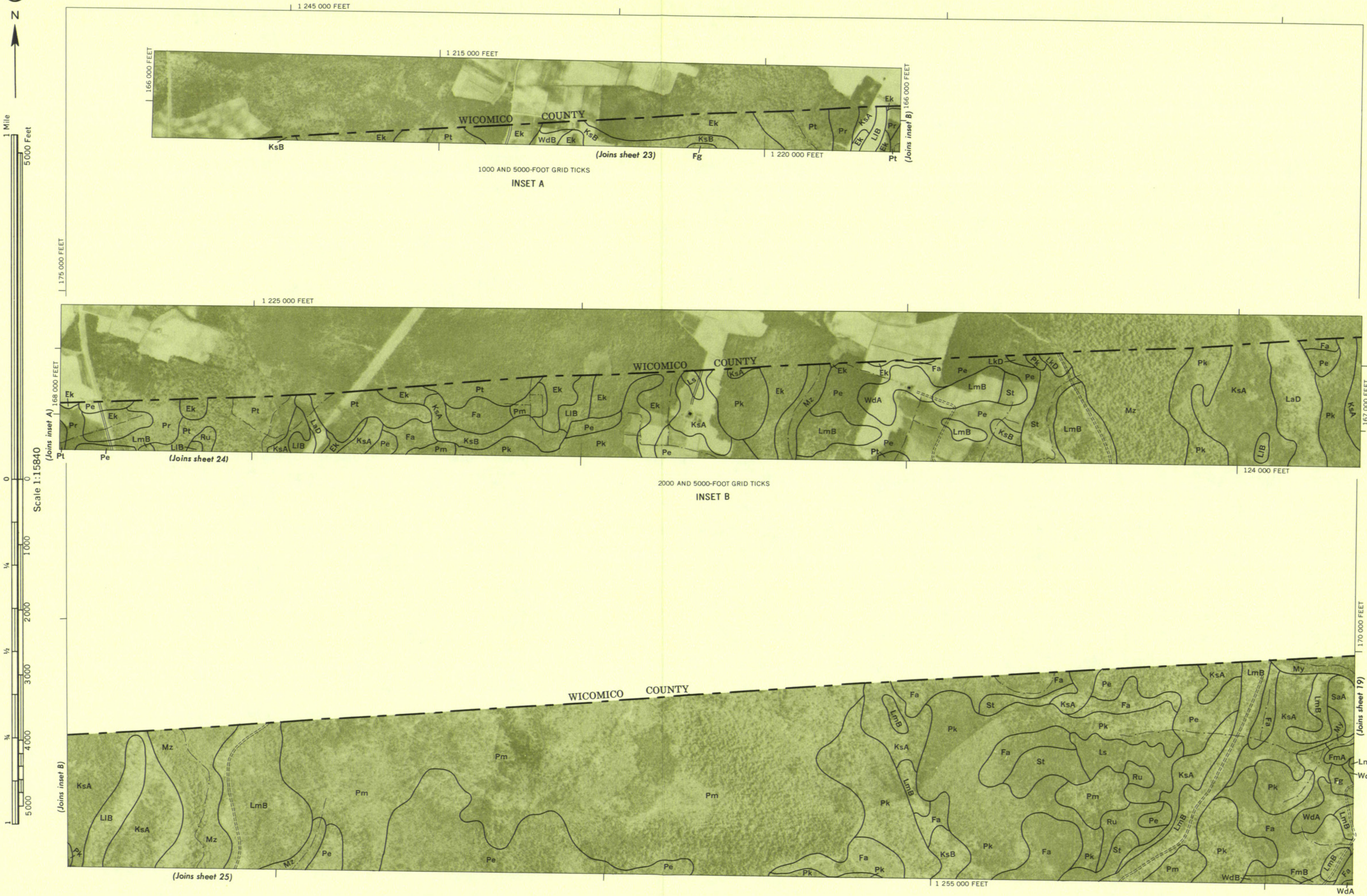
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system. 1927 North American datum.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.



This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

WORCESTER COUNTY, MARYLAND NO. 17



WORCESTER COUNTY, MARYLAND NO. 18

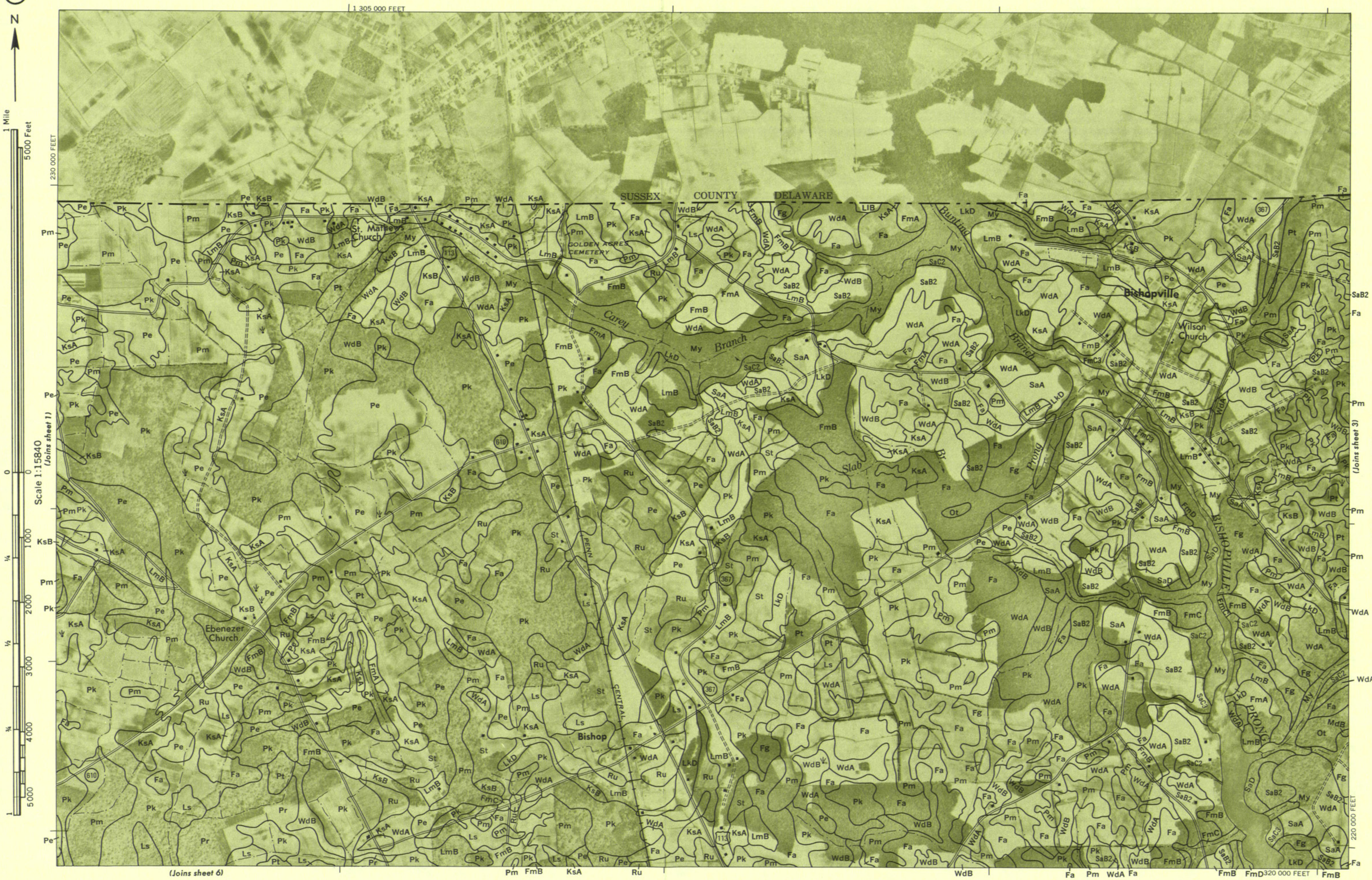
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station. Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

WORCESTER COUNTY, MARYLAND NO. 19

WORCESTER COUNTY, MARYLAND — SHEET NUMBER 2



WORCESTER COUNTY, MARYLAND NO. 2

Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system. 1927 North American datum.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

WORCESTER COUNTY, MARYLAND — SHEET NUMBER 20

N

(Joins sheet 14)

1 285 000 FEET

(Joins sheet 19)

(Joins sheet 21)

(Joins sheet 27)

175 000 FEET

170 000 FEET

1 300 000 FEET

1 Mile

5000 Feet

Scale 1:15840

0 1000 2000 3000 4000 5000

0 ¼ ½ ¾ 1

WORCESTER COUNTY, MARYLAND NO. 20

Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system. 1927 North American datum.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

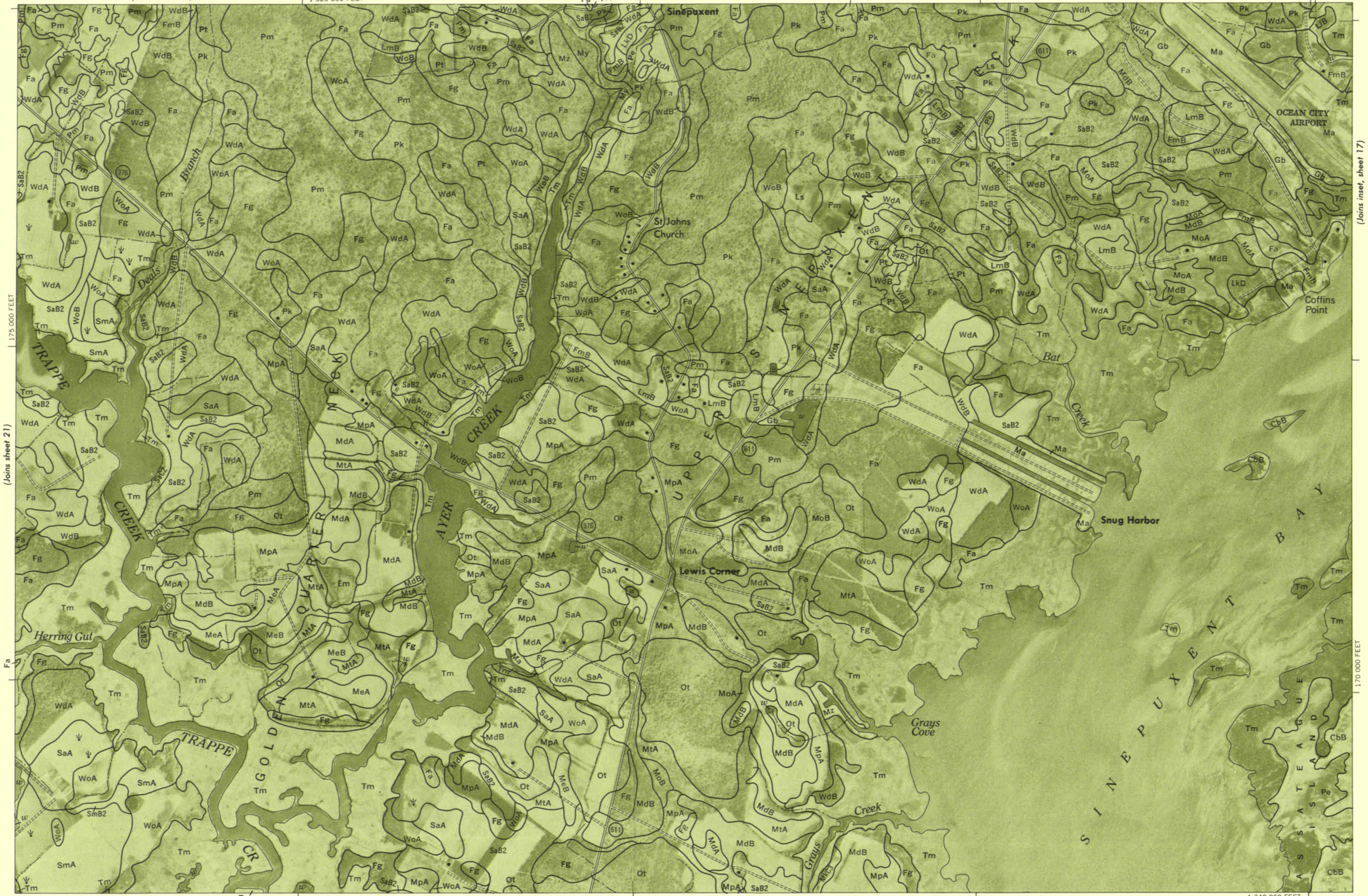
This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station. Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

WORCESTER COUNTY, MARYLAND NO. 21

WORCESTER COUNTY, MARYLAND — SHEET NUMBER 22

N

(Joins sheet 16)



(Joins sheet 21)

(Joins inset, sheet 17)

(Joins sheet 29)

1 Mile

5000 Feet

Scale 1:15840

WORCESTER COUNTY, MARYLAND NO. 22

Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system. 1927 North American datum.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

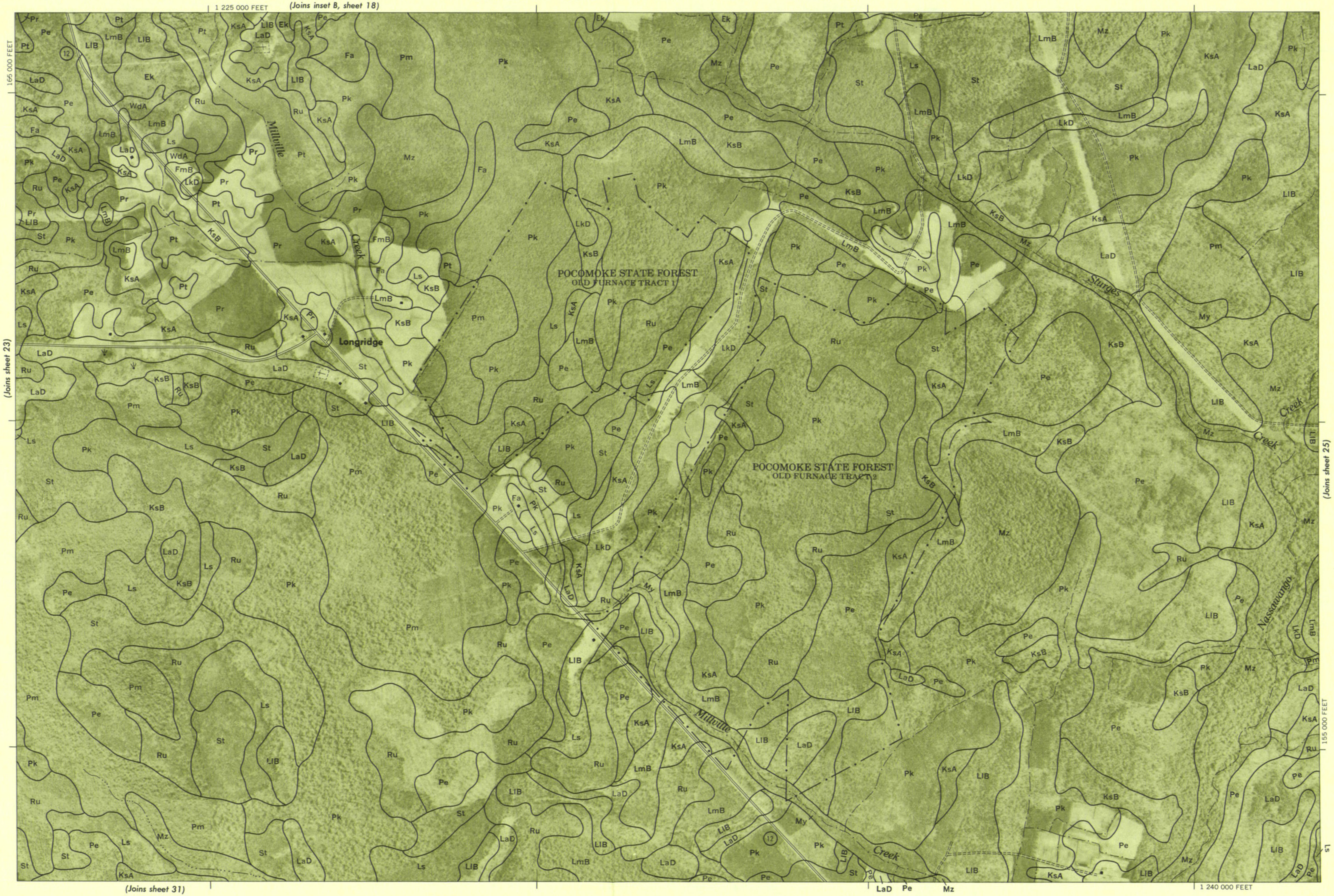
This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station. Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

WORCESTER COUNTY, MARYLAND NO. 23

WORCESTER COUNTY, MARYLAND — SHEET NUMBER 24

N

1 Mile
5000 Feet
0
1000
2000
3000
4000
5000
0
¼
½
¾
1
Scale 1:15840

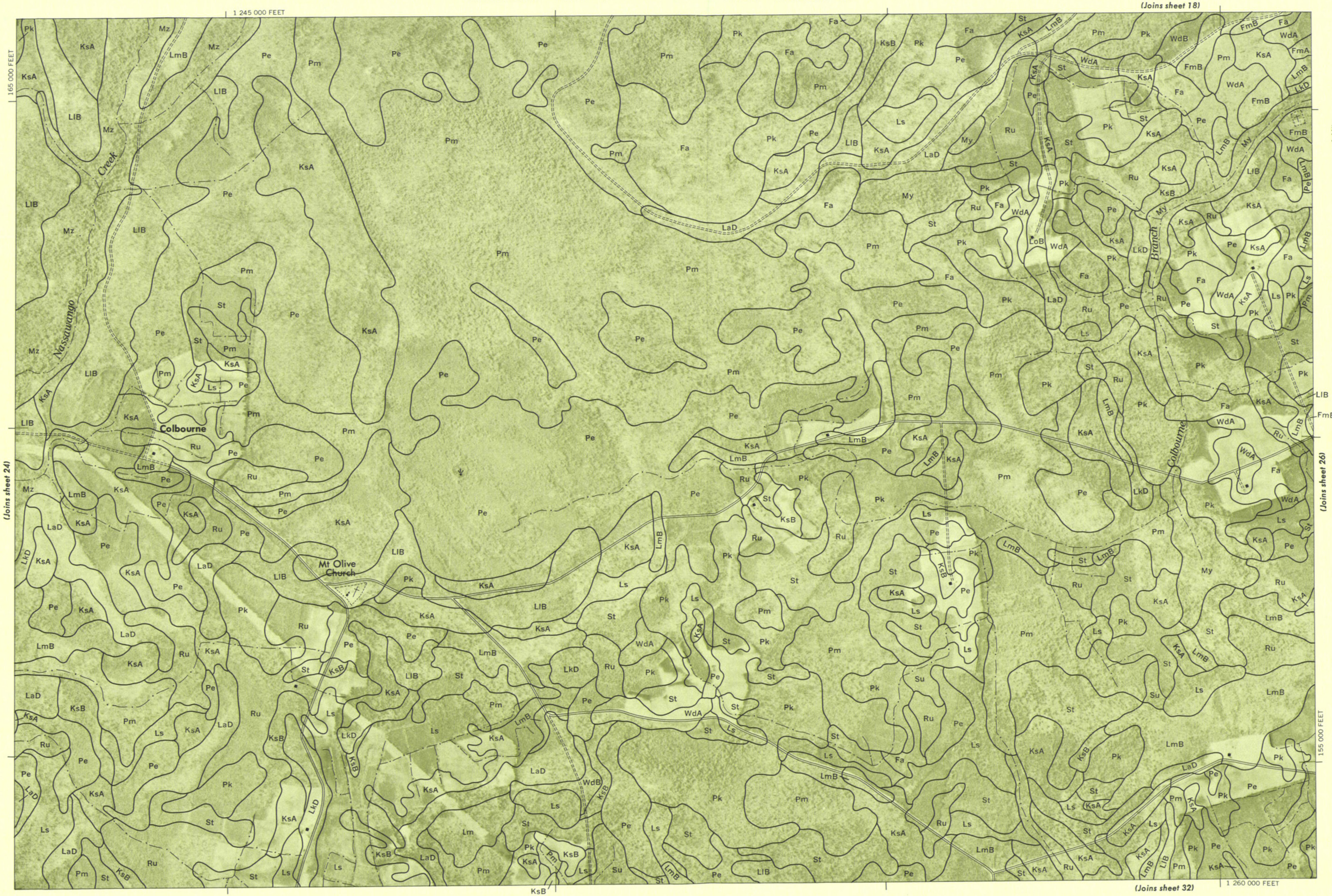


WORCESTER COUNTY, MARYLAND NO. 24

Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

25



N

Scale 1:15840

1 Mile

5000 Feet

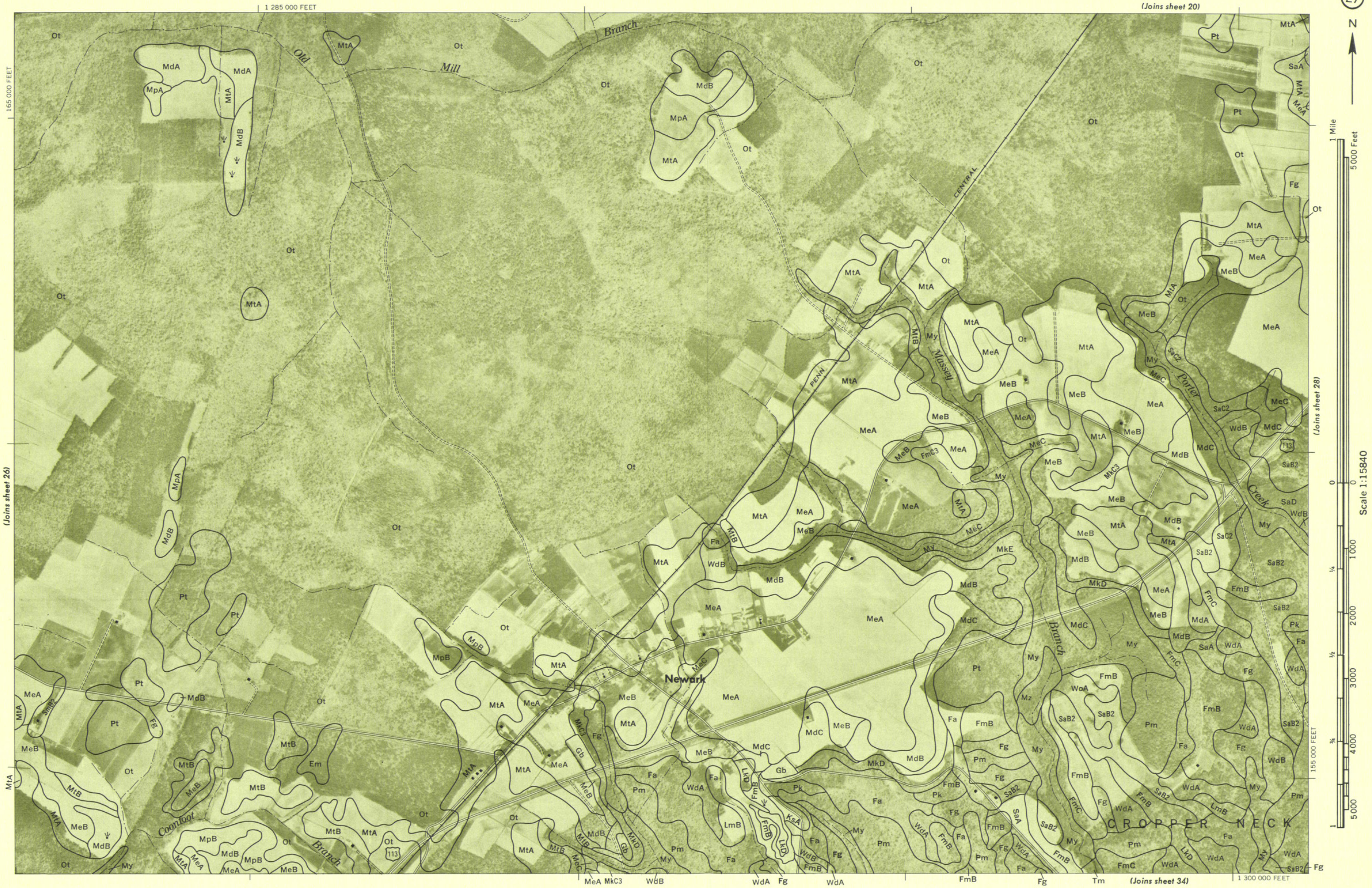
This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

WORCESTER COUNTY, MARYLAND NO. 25


26
N
(Joins sheet 19)
1 265 000 FEET
165 000 FEET
(Joins sheet 25)
(Joins sheet 27)
(Joins sheet 33)
1 280 000 FEET
155 000 FEET
1 Mile
5000 Feet
Scale 1:15840
Colbourne Branch
Mt Zion Church
354
Pocomoke River
Old Mill Branch
Powell Branch
Pocomoke River
Tilghman Mill Branch
Coonbot Branch
WORCESTER COUNTY, MARYLAND NO. 26
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.
This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station. Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

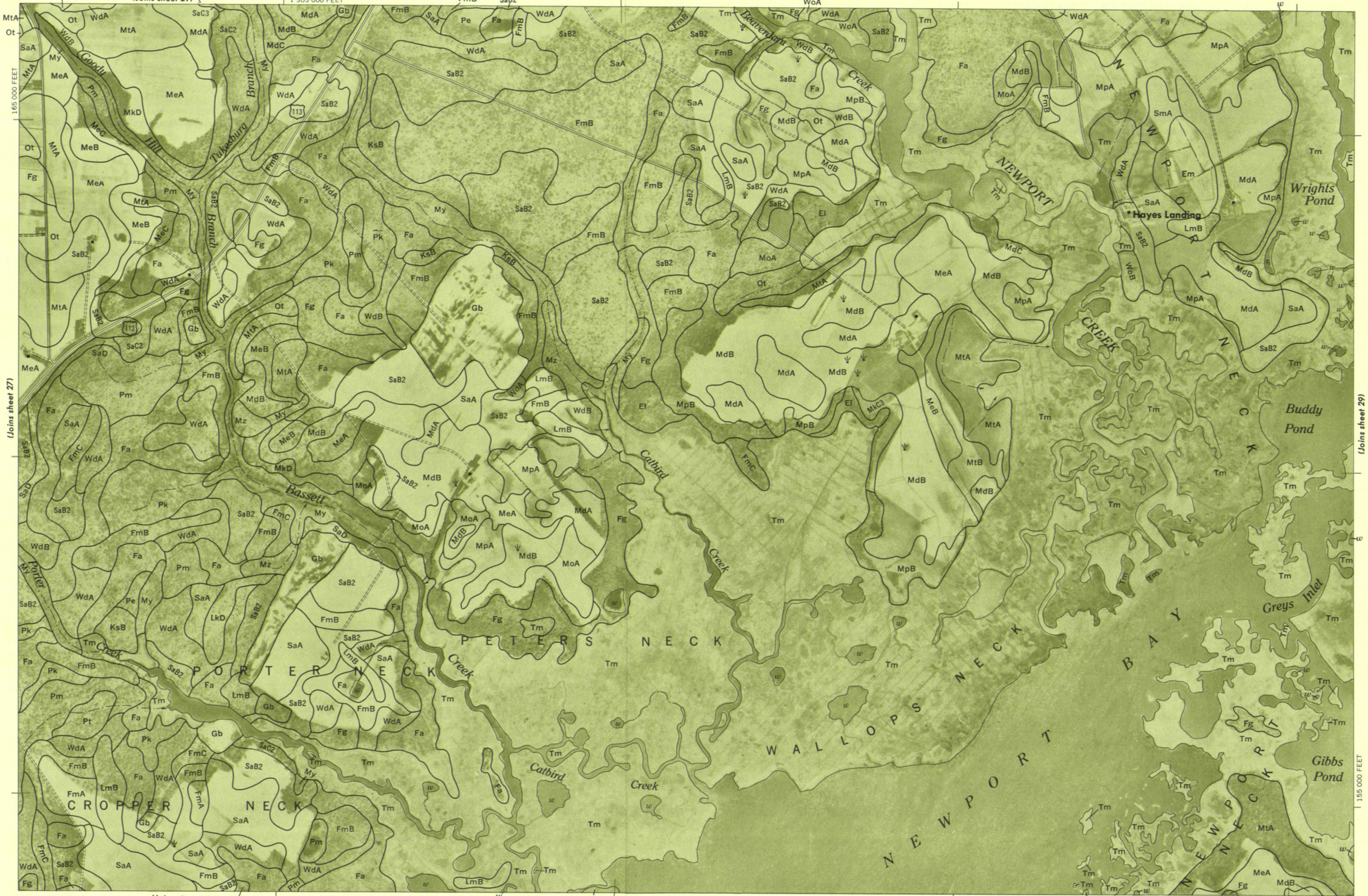
WORCESTER COUNTY, MARYLAND NO. 27



WORCESTER COUNTY, MARYLAND — SHEET NUMBER 28

N

1 Mile
5000 Feet
Scale 1:15840
0 1000 2000 3000 4000 5000
0 ¼ ½ ¾ 1



WORCESTER COUNTY, MARYLAND NO. 28

Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system. 1927 North American datum.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

(Joins sheet 22) | (17)

(Joins sheet 28)

(Joins sheet 36)

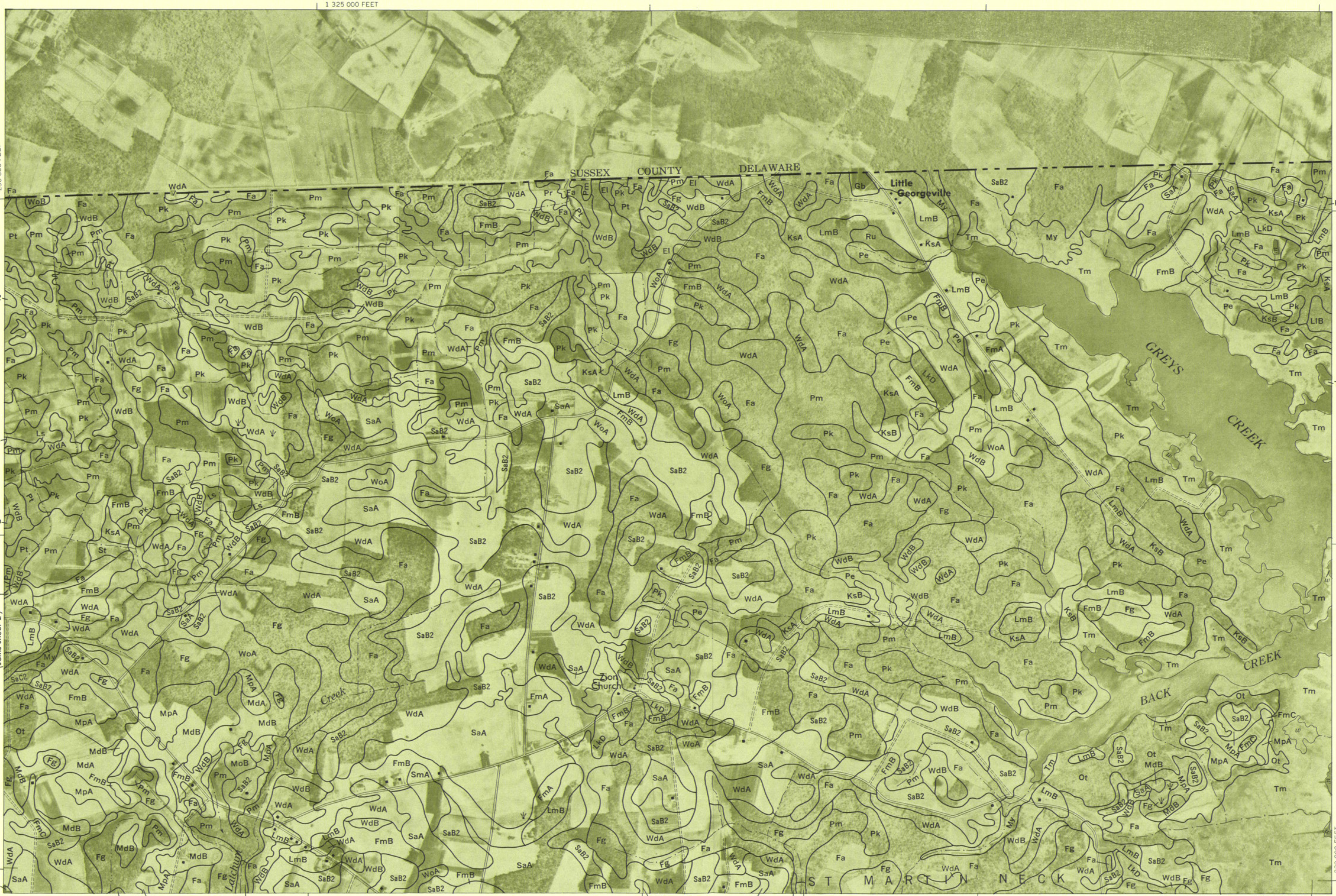
WORCESTER COUNTY, MARYLAND NO. 29

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

3

1 325 000 FEET

230 000 FEET



N

Scale 1:15840

1 Mile

5000 Feet

(Joins sheet 2)

(Joins sheet 4)

(Joins sheet 7)

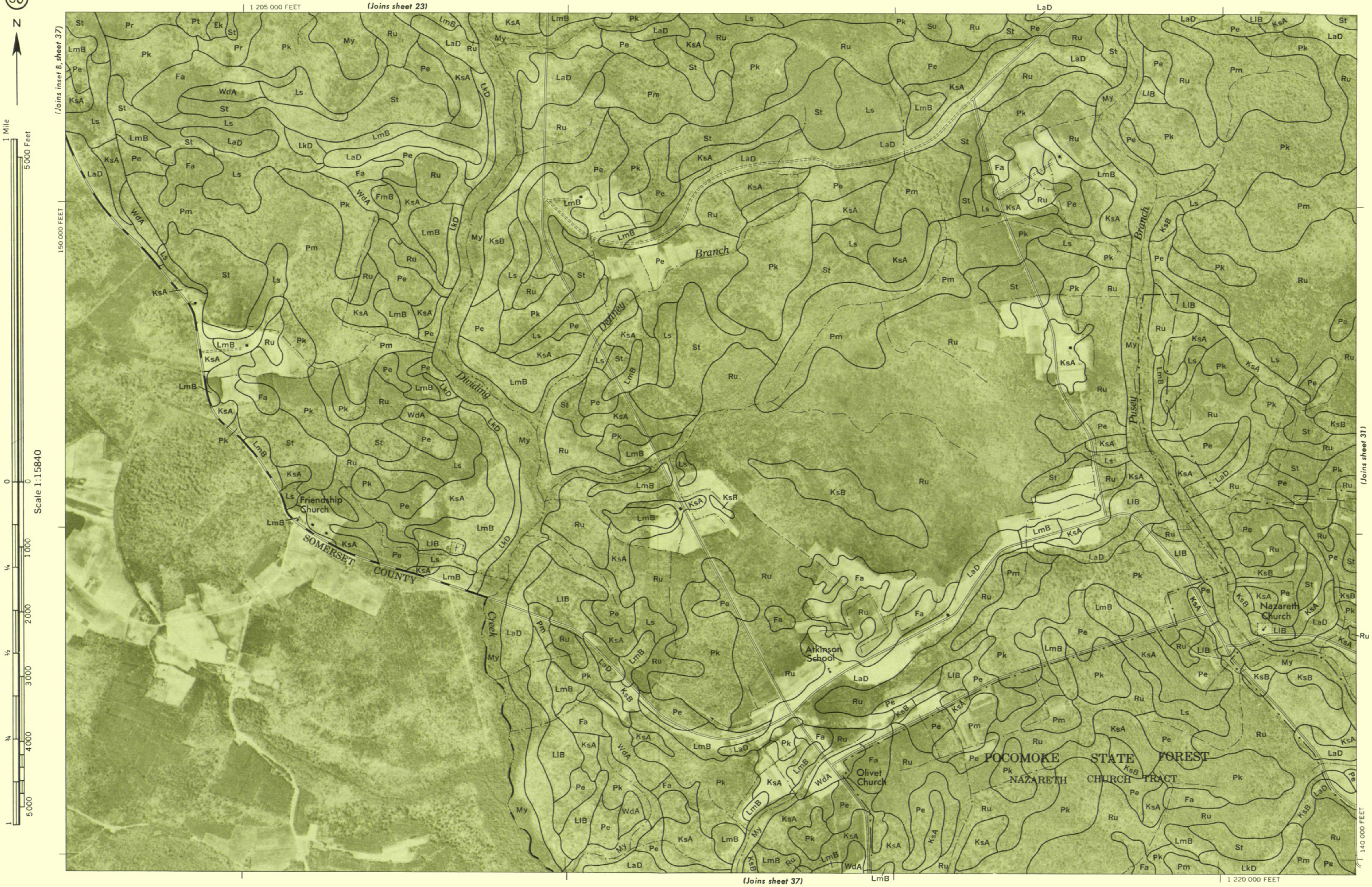
220 000 FEET

1 400 000 FEET

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

WORCESTER COUNTY, MARYLAND NO. 3

WORCESTER COUNTY, MARYLAND — SHEET NUMBER 30



Scale 1:15840

1 Mile

5000 Feet

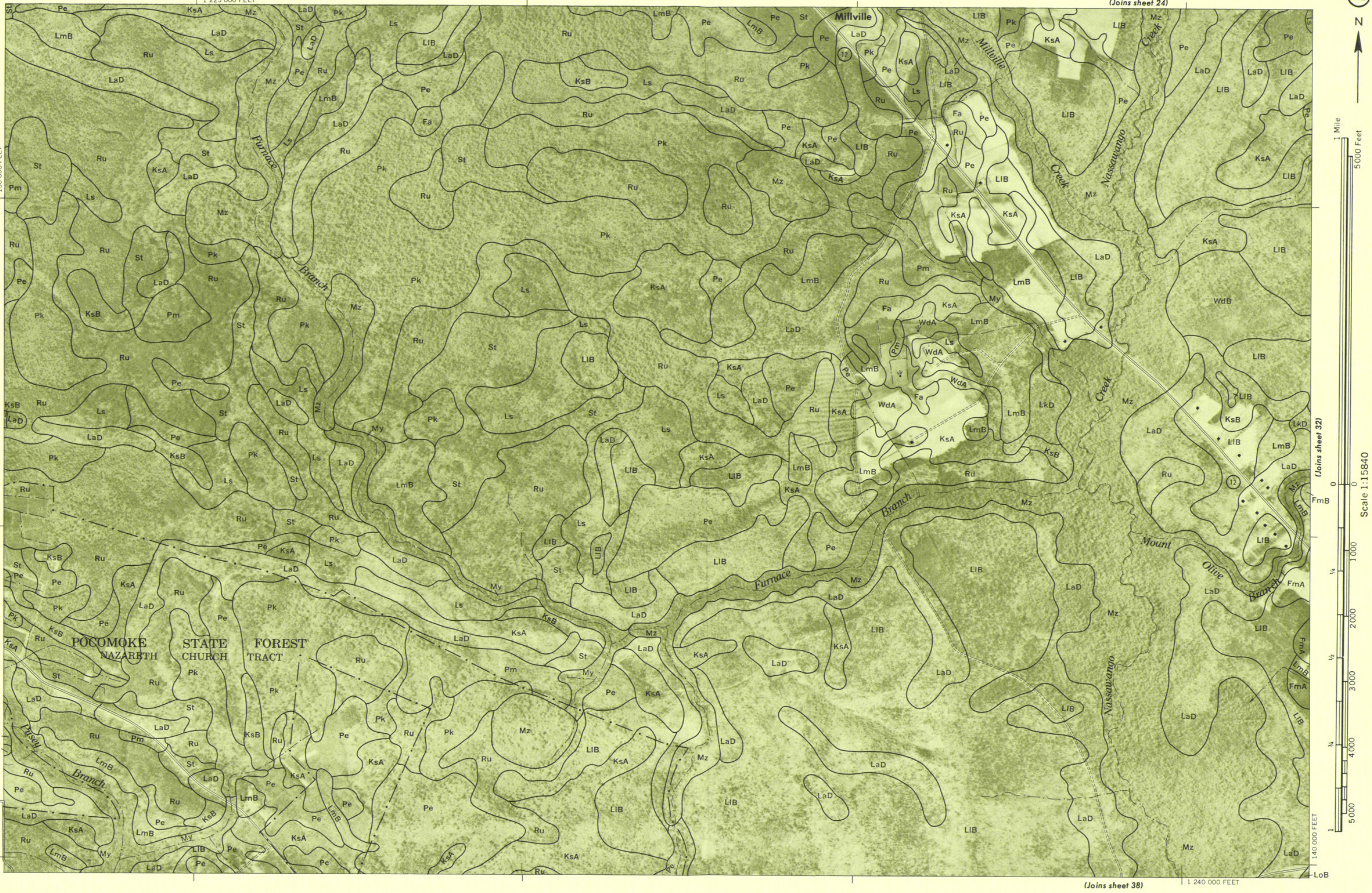
WORCESTER COUNTY, MARYLAND NO. 30

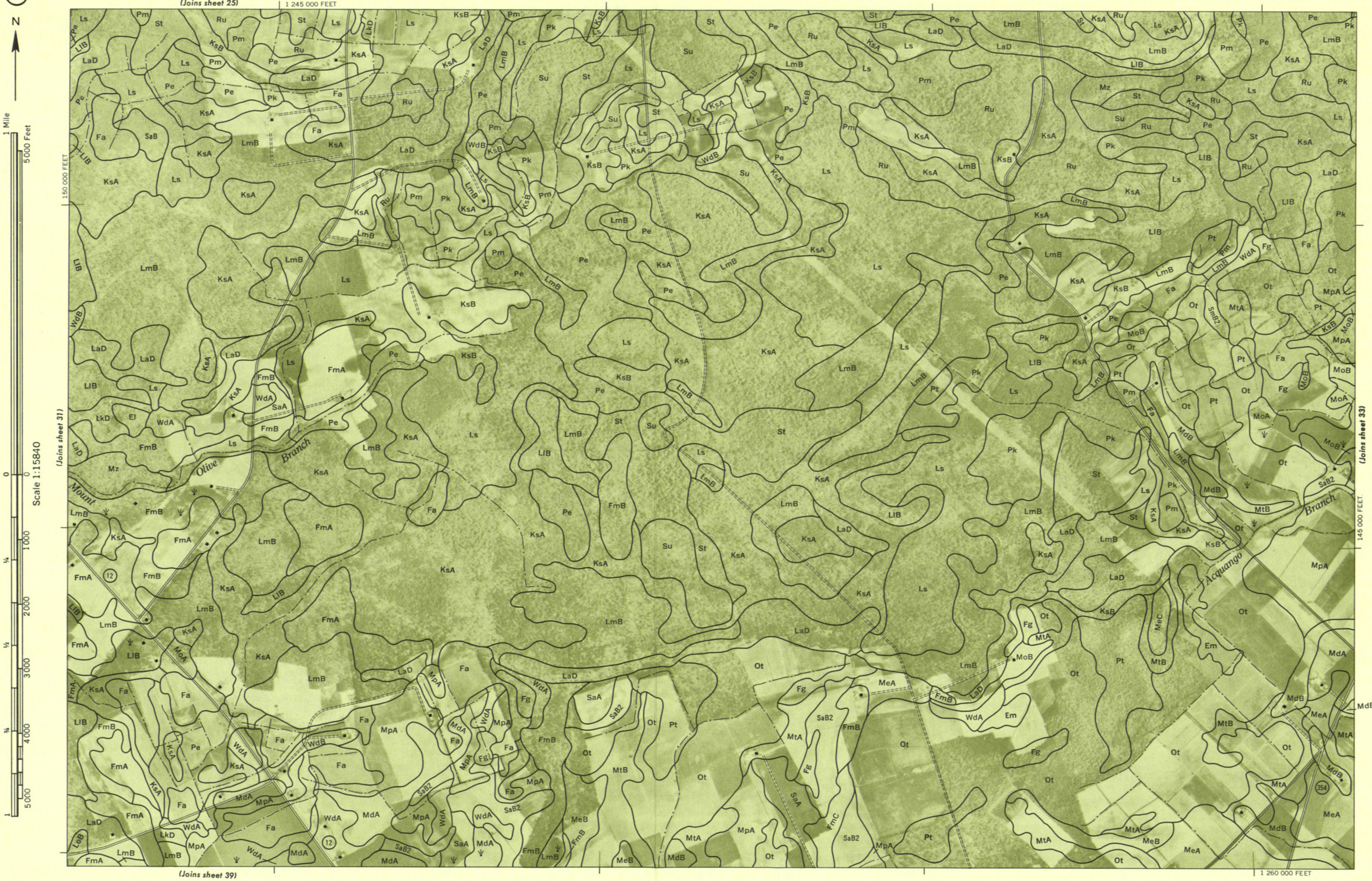
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

WORCESTER COUNTY, MARYLAND NO. 31





WORCESTER COUNTY, MARYLAND NO. 32

Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

(Joins sheet 26)

(Joins sheet 32)

(Joins sheet 34)

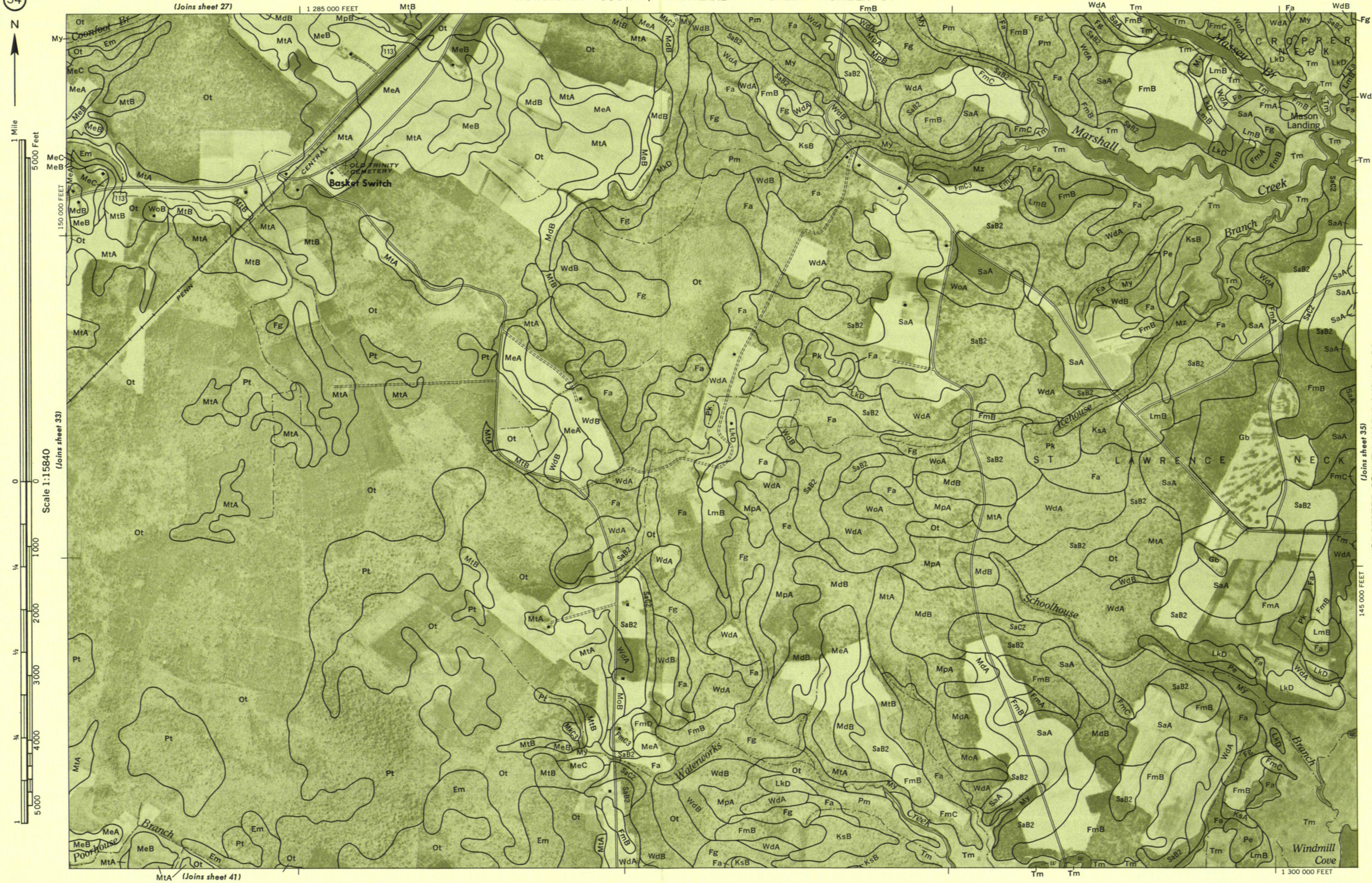
(Joins sheet 40)

1 Mile
5000 Feet
Scale 1:15840

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

WORCESTER COUNTY, MARYLAND NO. 33

WORCESTER COUNTY, MARYLAND — SHEET NUMBER 34



WORCESTER COUNTY, MARYLAND NO. 34

Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

(35)

N

Scale 1:15840

1 Mile ½ ¼ 0

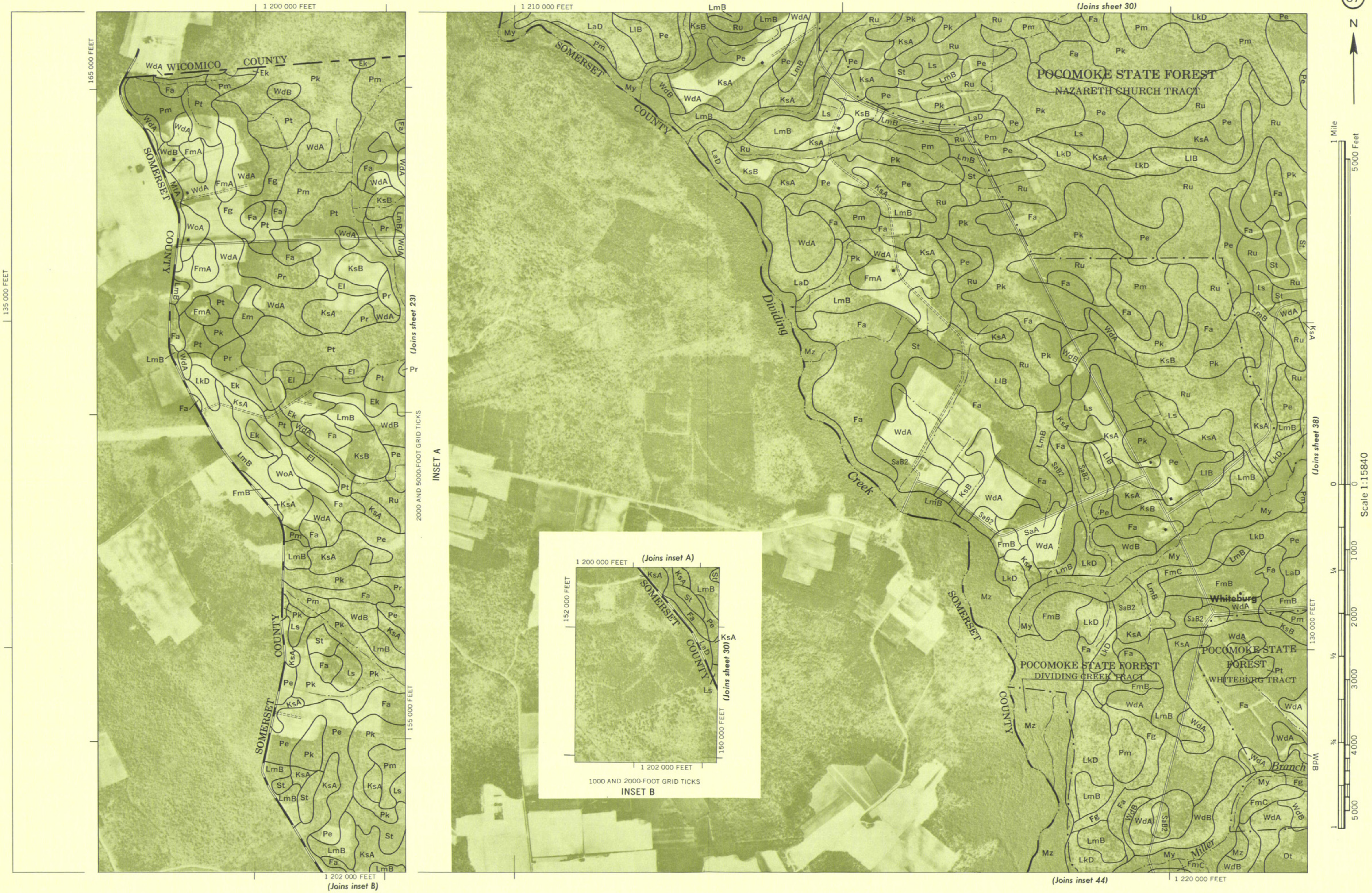
5000 Feet 4000 3000 2000 1000 0

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

WORCESTER COUNTY, MARYLAND NO. 36

Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system. 1927 North American datum.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

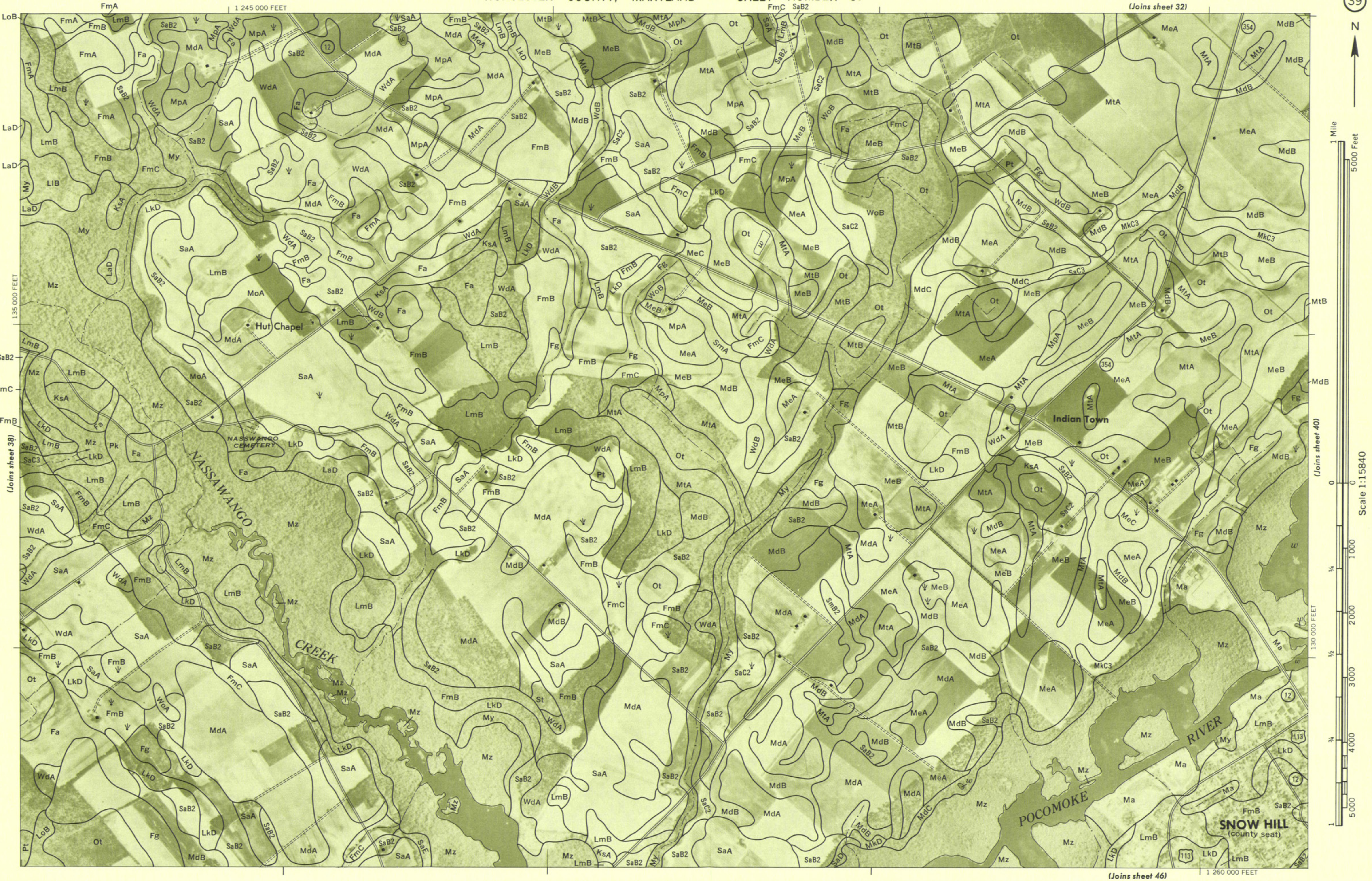


This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

WORCESTER COUNTY, MARYLAND NO. 37

WORCESTER COUNTY, MARYLAND NO. 38

Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.
This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

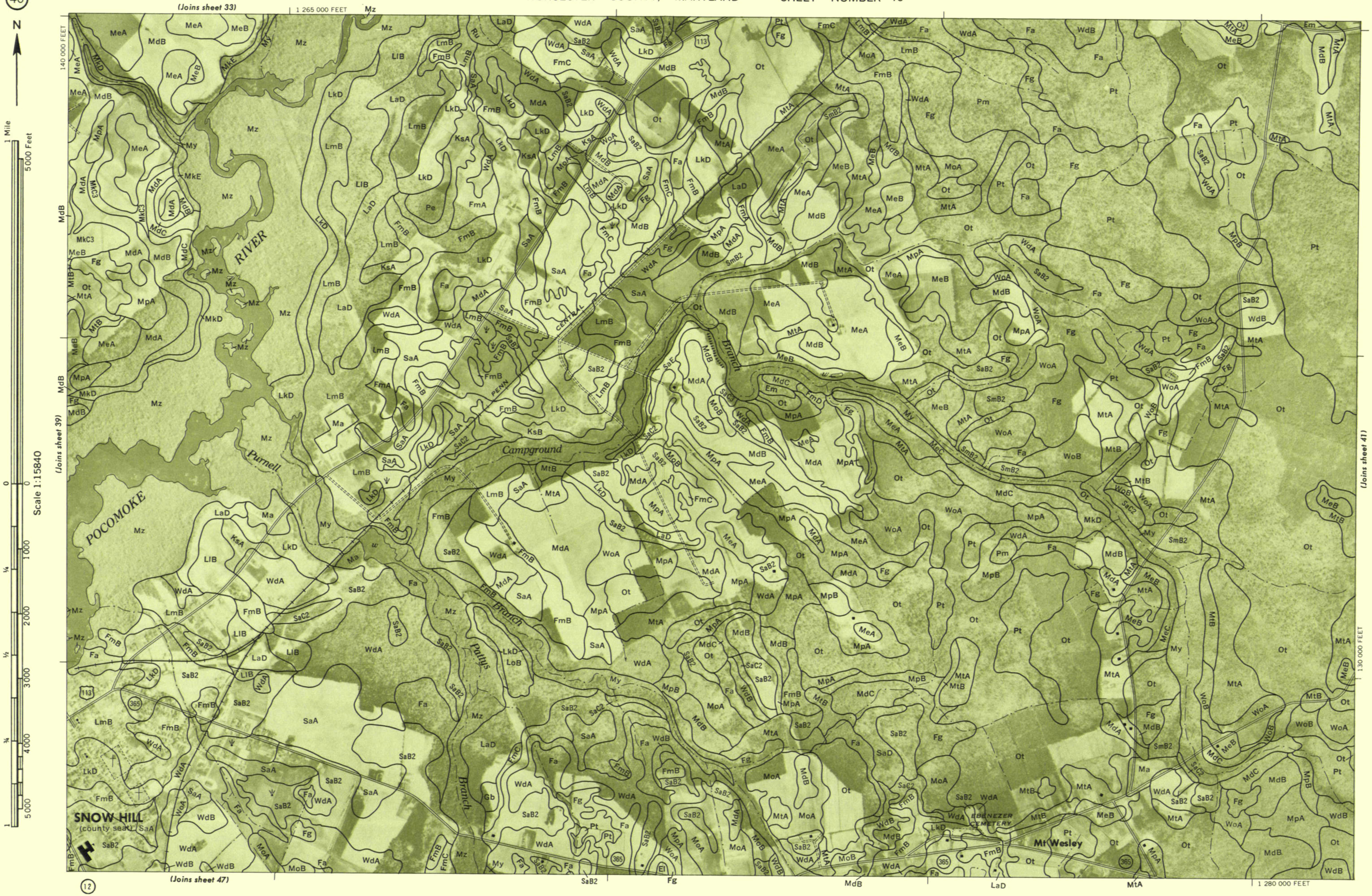


This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system. 1927 North American datum.
WORCESTER COUNTY, MARYLAND NO. 39

WORCESTER COUNTY, MARYLAND NO. 4

Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system. 1927 North American datum.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.



WORCESTER COUNTY, MARYLAND NO. 40

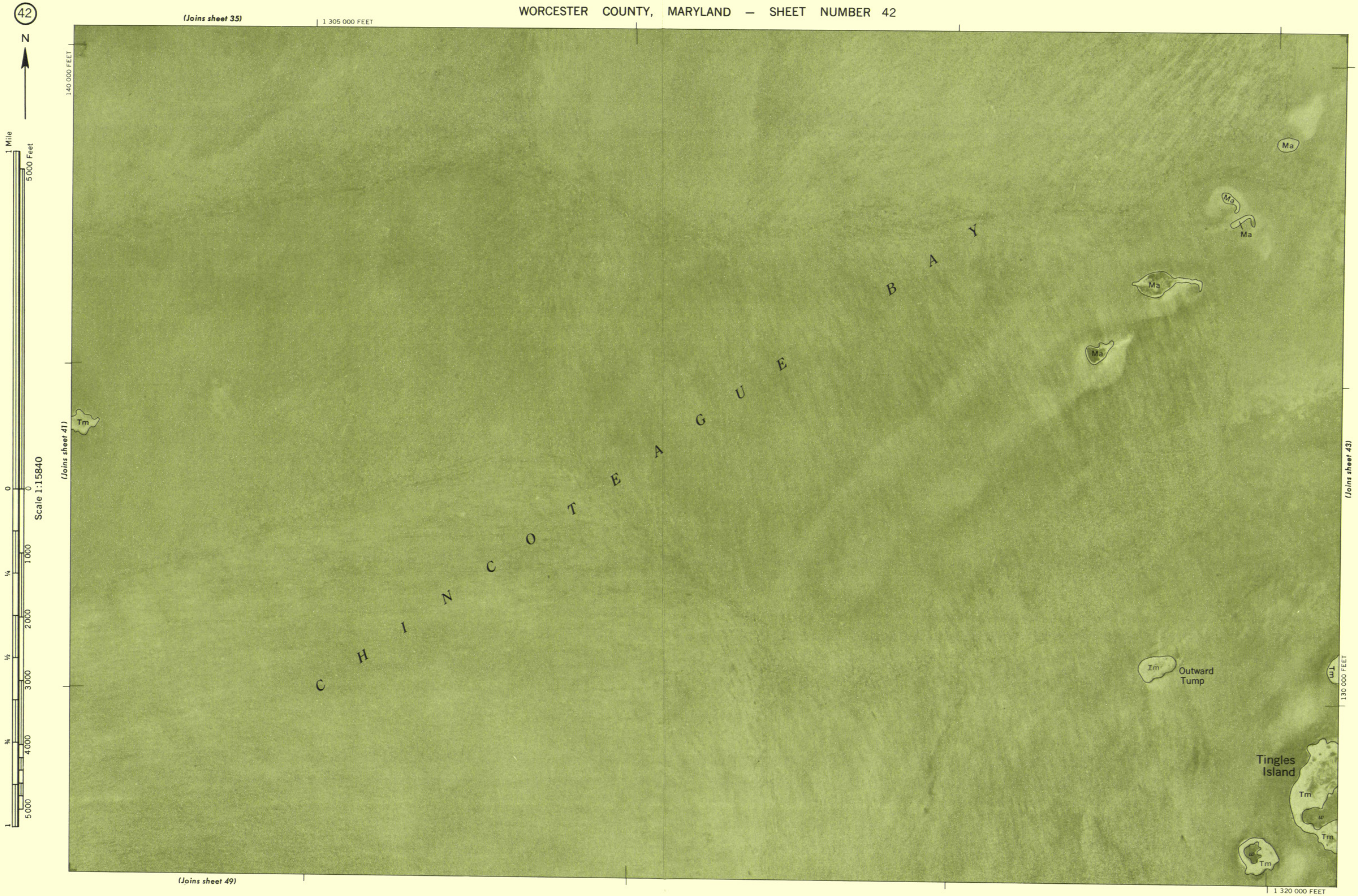
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system. 1927 North American datum.

WORCESTER COUNTY, MARYLAND NO. 41

WORCESTER COUNTY, MARYLAND — SHEET NUMBER 42



WORCESTER COUNTY, MARYLAND NO. 42

Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system. 1927 North American datum.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

43

WORCESTER COUNTY, MARYLAND NO. 43

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

WORCESTER COUNTY, MARYLAND — SHEET NUMBER 44

Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

WORCESTER COUNTY, MARYLAND NO. 45

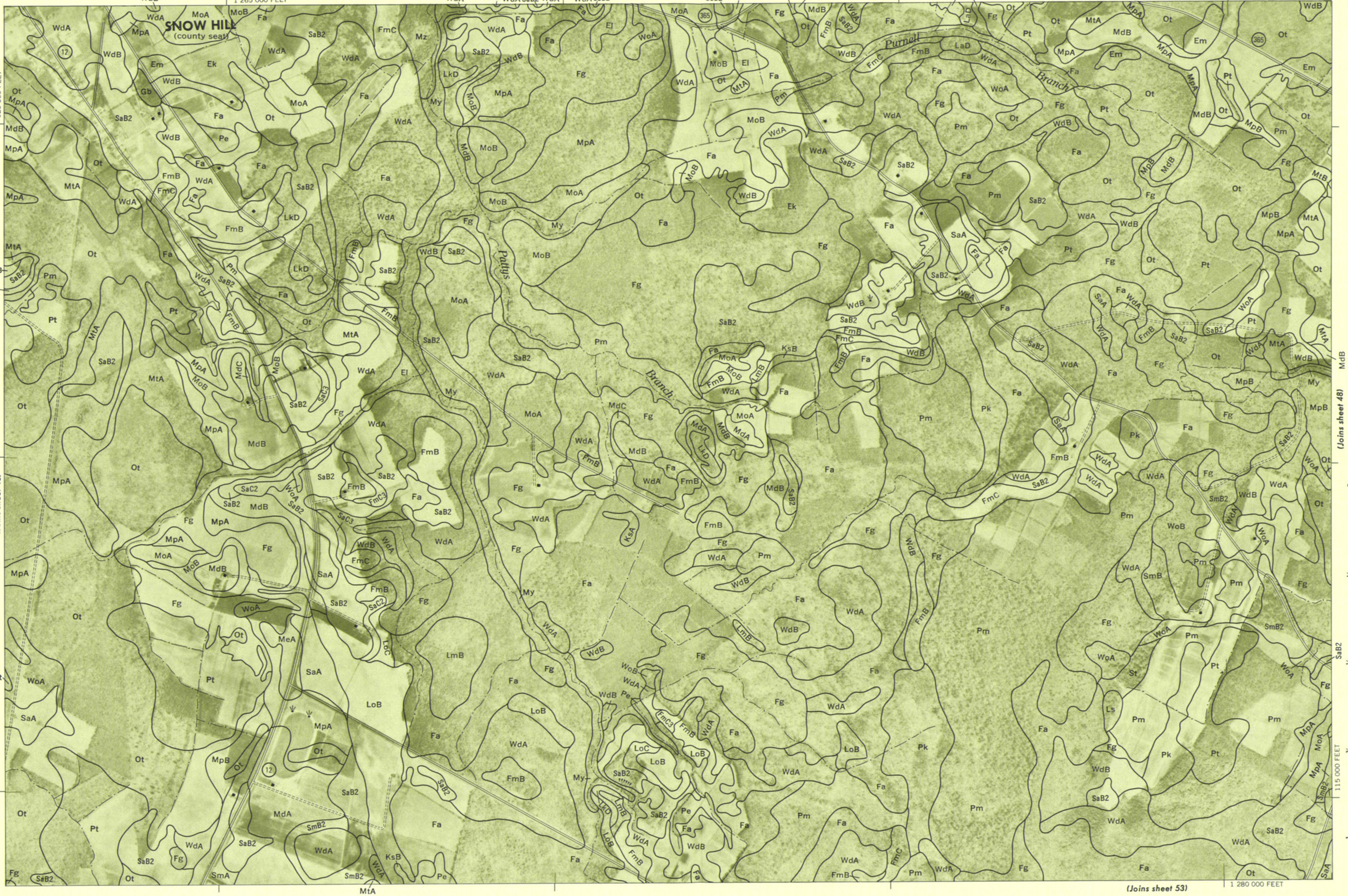
N

1 Mile

5000 Feet

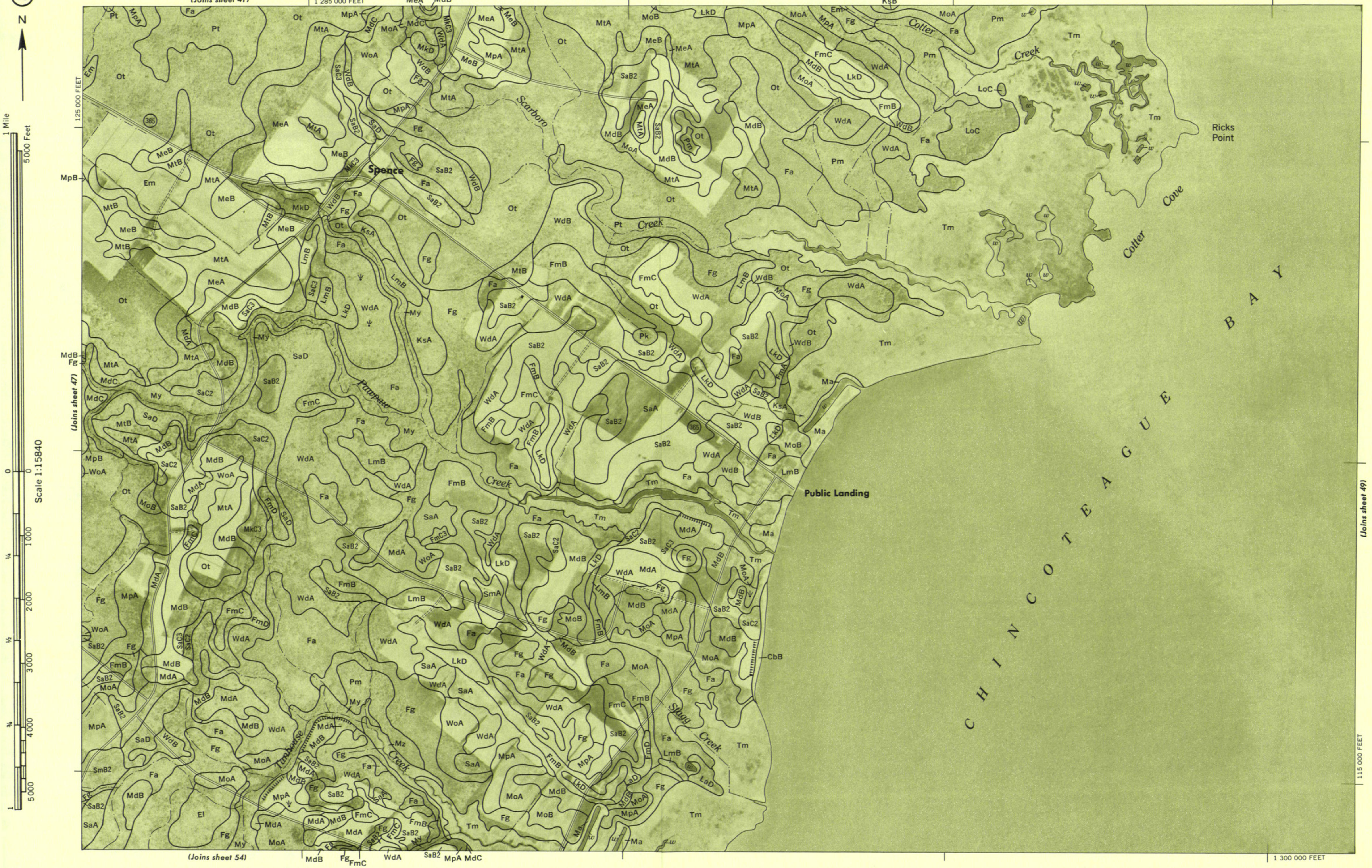
Scale 1:15840


46
N
Scale 1:15840
1 Mile
5000 Feet
(Joins sheet 39)
(Joins sheet 45)
(Joins sheet 47)
(Joins sheet 52)
1 245 000 FEET
1 260 000 FEET
125 000 FEET
115 000 FEET
SNOW HILL
(county seat)
NASSAWANGO CREEK
POCOMOKE RIVER
POCOMOKE RIVER
Red Landing
Drexell Landing
SHAD LANDING STATE PARK
POCOMOKE STATE FOREST
CORKERS CREEK – HUDSON TRACT
POCOMOKE STATE FOREST
Corkers Creek
Hardship Branch
Drexell Branch
113
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.
This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.
WORCESTER COUNTY, MARYLAND NO. 46



This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

WORCESTER COUNTY, MARYLAND NO. 47



Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

WORCESTER COUNTY, MARYLAND NO. 49

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system. 1927 North American datum.

WORCESTER COUNTY, MARYLAND NO. 5

N

1 Mile

5000 Feet

Scale 1:15840

0 1000 2000 3000 4000 5000

0 ¼ ½ ¾ 1

(Joins sheet 44)

(Joins sheet 51)

(Joins sheet 56)

Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

(51)

N

1 Mile
5000 Feet
Scale 1:15840

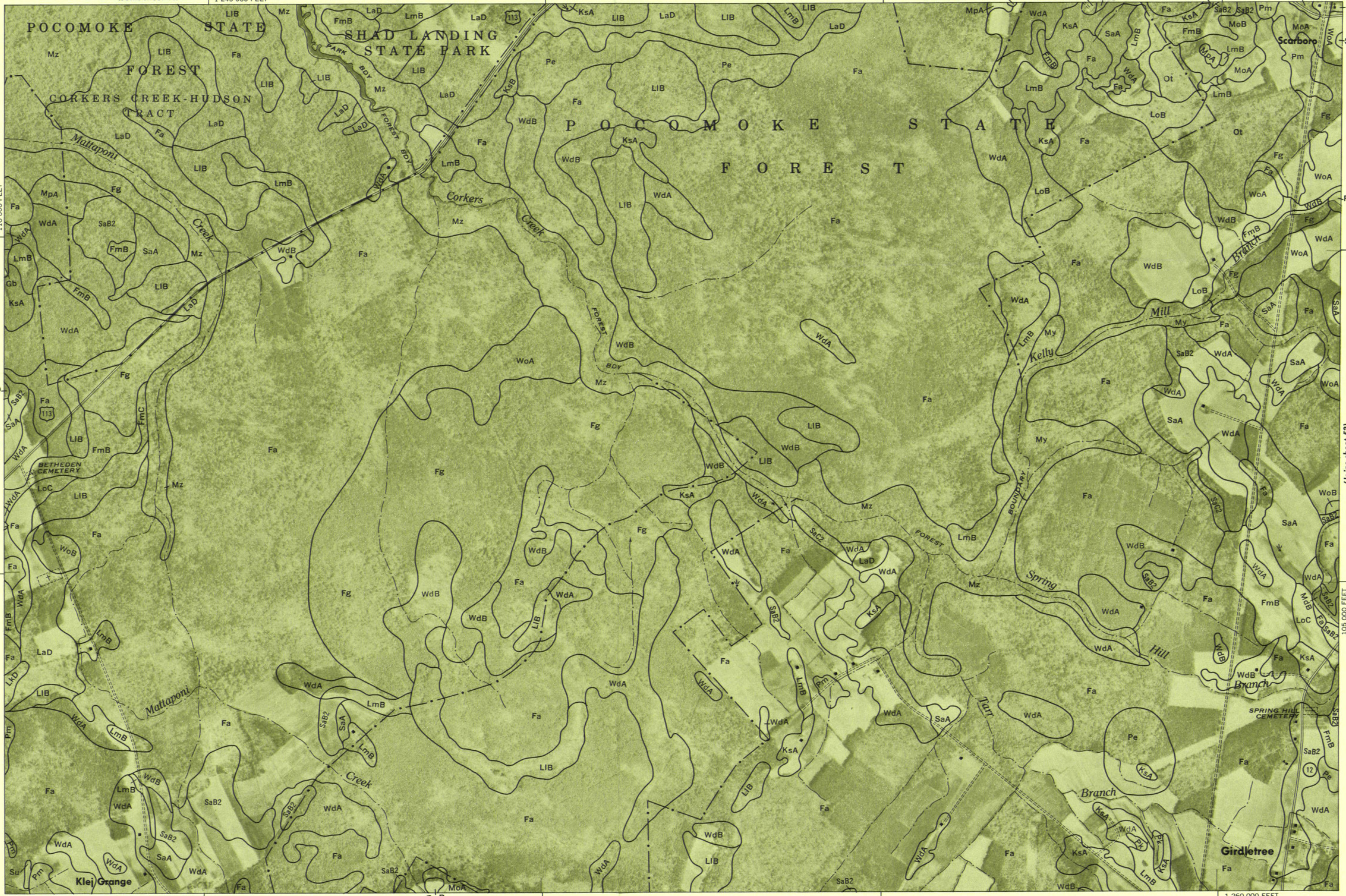
This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

WORCESTER COUNTY, MARYLAND NO. 51

(52)

N

(Joins sheet 46)



(Joins sheet 51)

(Joins sheet 53)

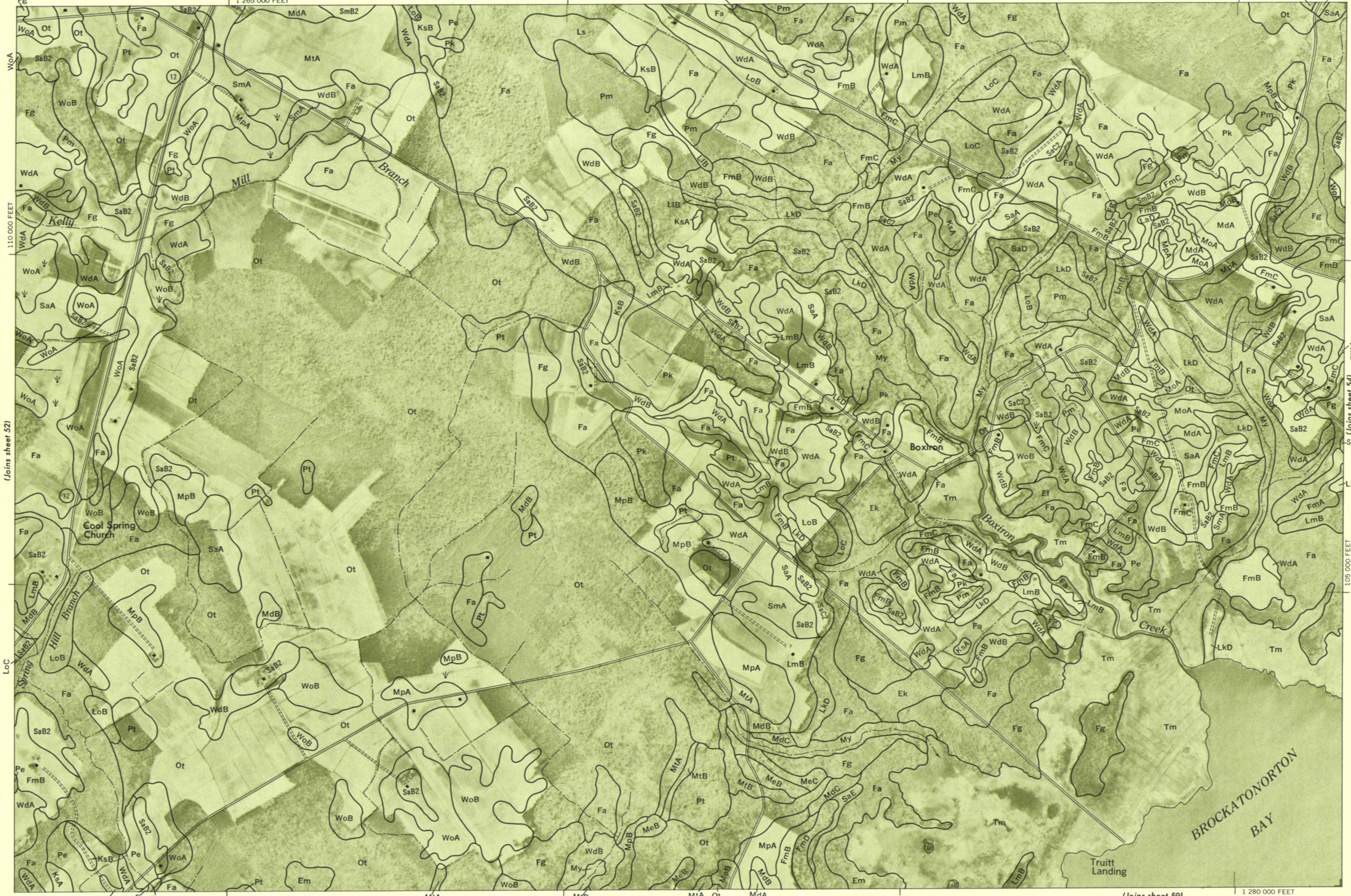
(Joins sheet 58)

1 Mile

5 000 Feet

Scale 1:15840

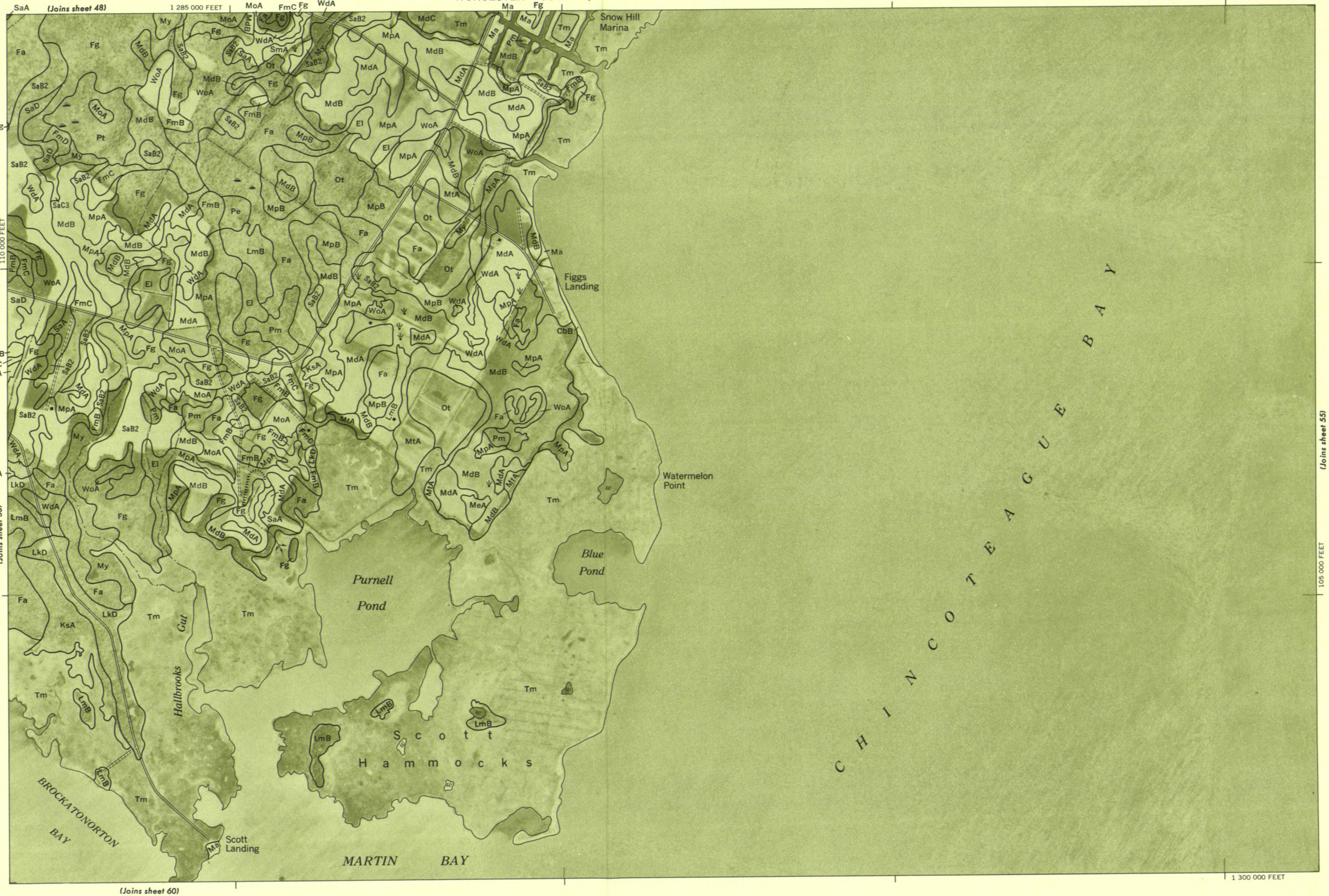
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.
This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.



This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

WORCESTER COUNTY, MARYLAND NO. 53

WORCESTER COUNTY, MARYLAND — SHEET NUMBER 54

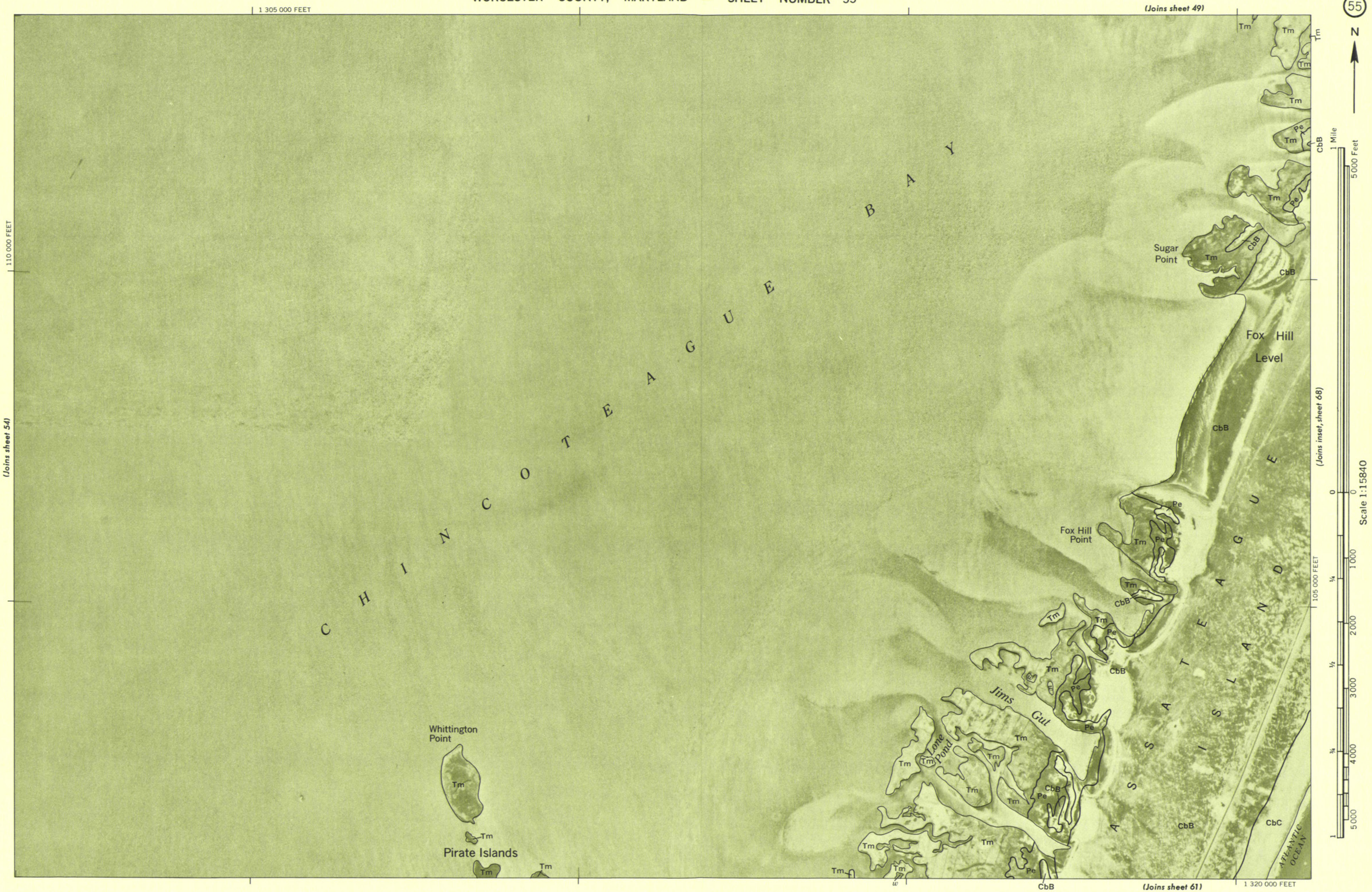


Scale 1:15840

1 Mile
5000 Feet
0 1000 2000 3000 4000 5000
0 ¼ ½ ¾ 1

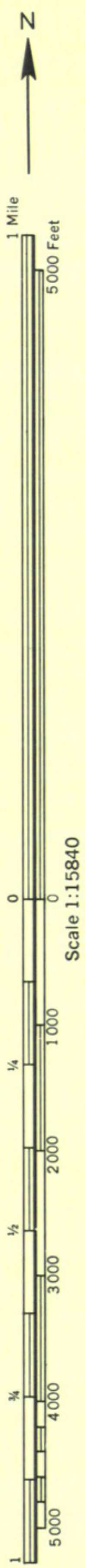
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.
This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

WORCESTER COUNTY, MARYLAND NO. 54



This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

WORCESTER COUNTY, MARYLAND NO. 55

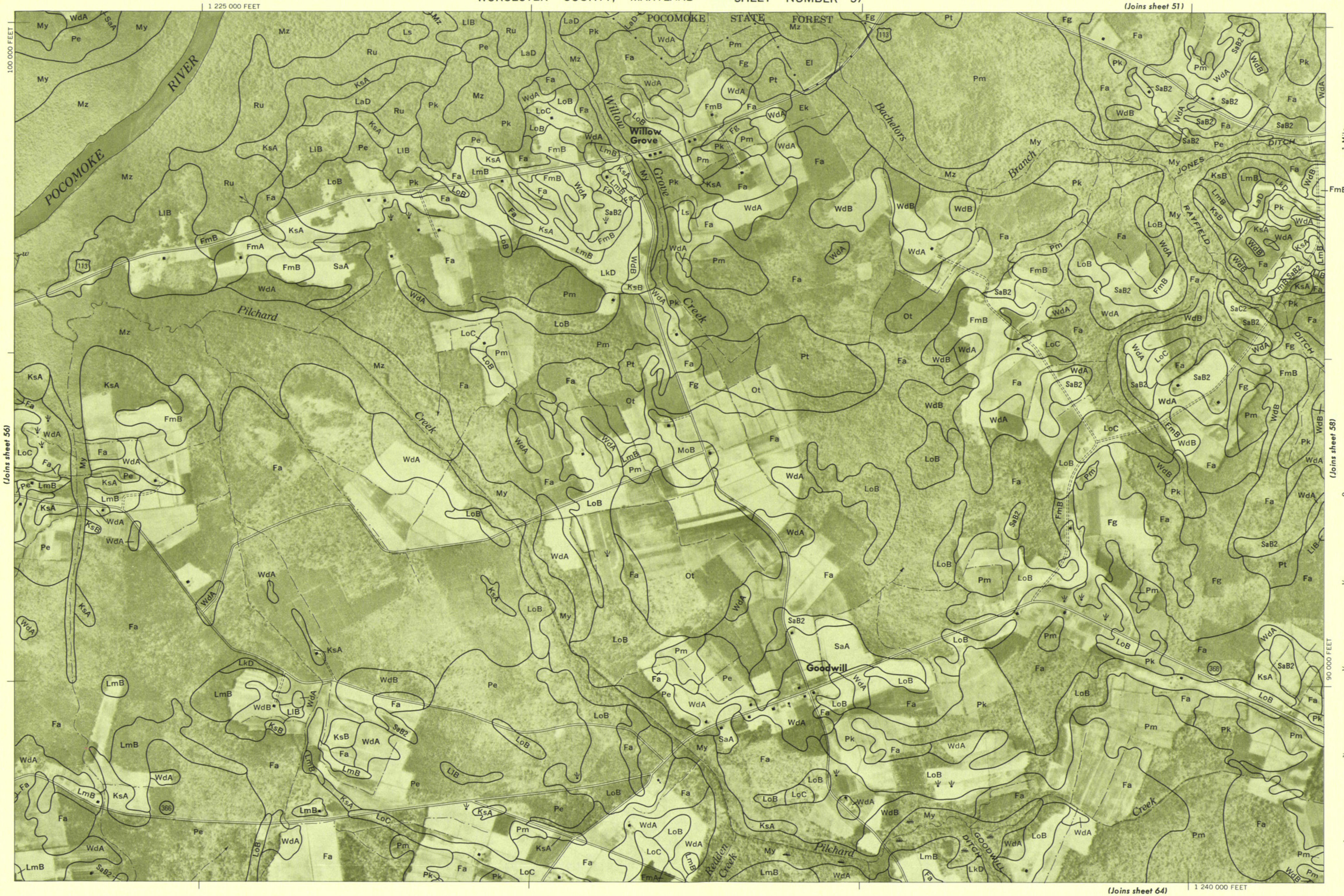


Scale 1:15840

Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

57

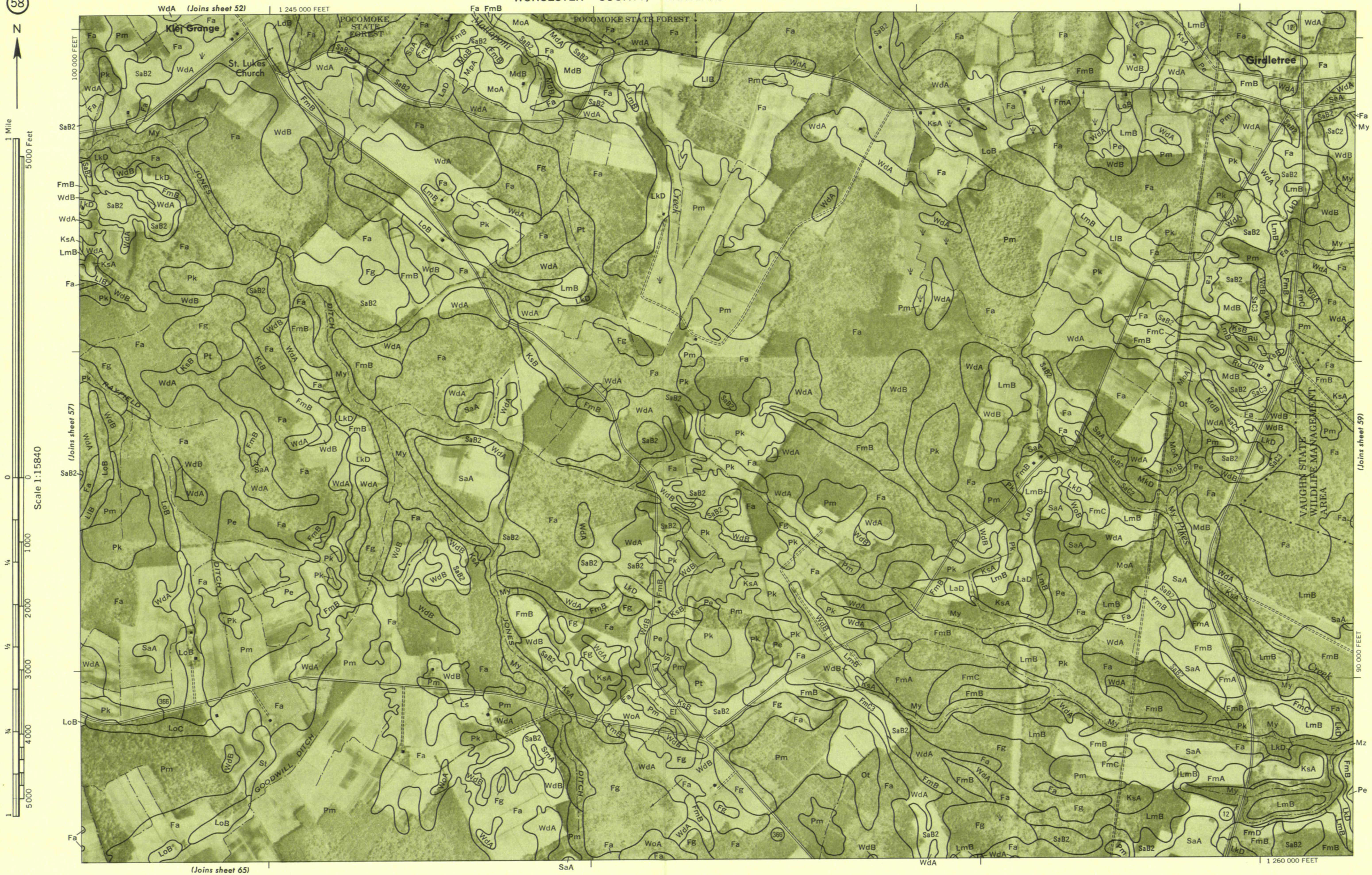


N

1 Mile
5000 Feet
Scale 1:15840

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum

WORCESTER COUNTY, MARYLAND NO. 57



Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

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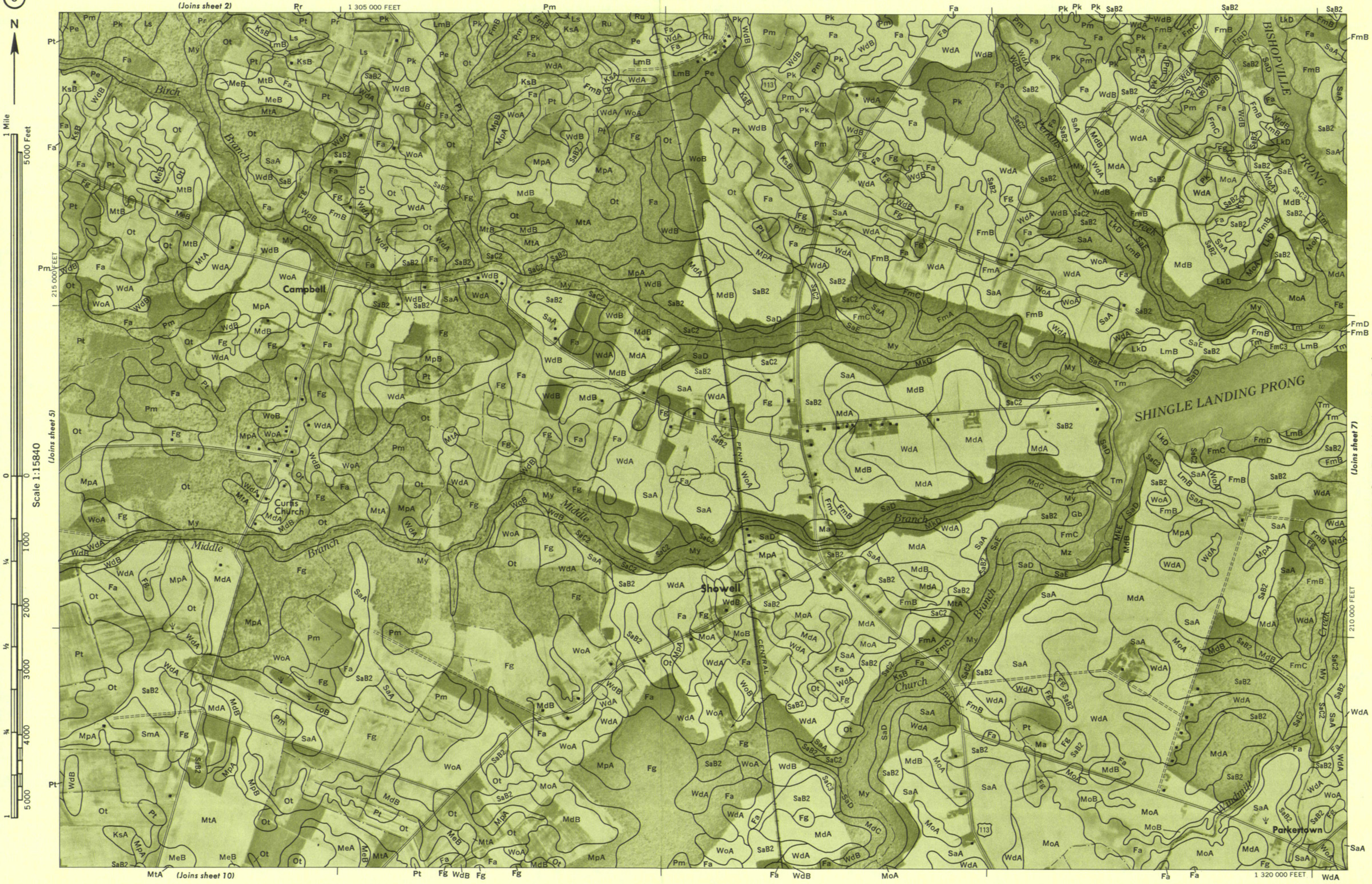
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system. 1927 North American datum.

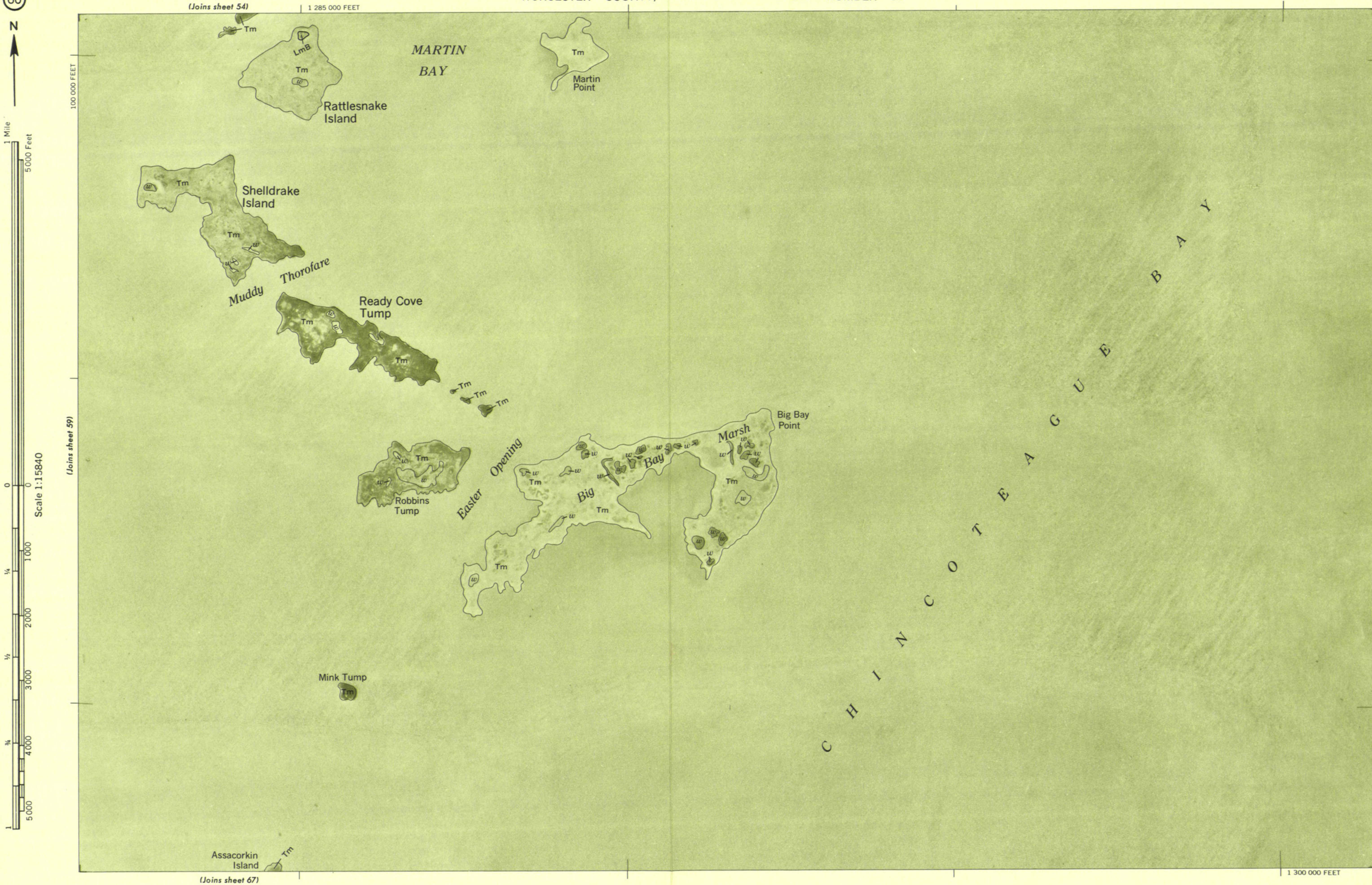
WORCESTER COUNTY, MARYLAND — SHEET NUMBER 6



WORCESTER COUNTY, MARYLAND NO. 6

Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.



Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system. 1927 North American datum.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system. 1927 North American datum.

WORCESTER COUNTY, MARYLAND — SHEET NUMBER 62

N

1 Mile

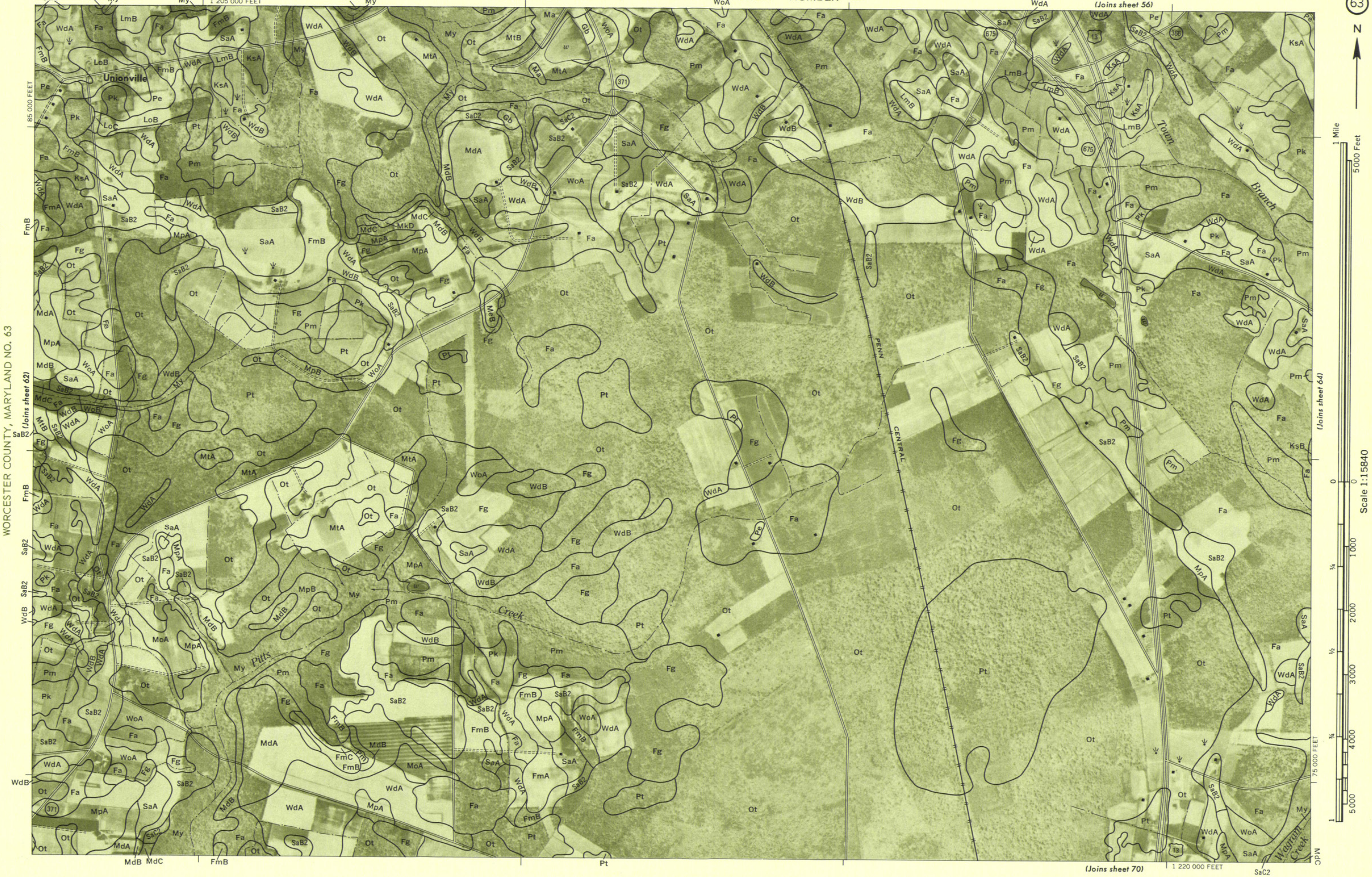
5000 Feet

Scale 1:15840

Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

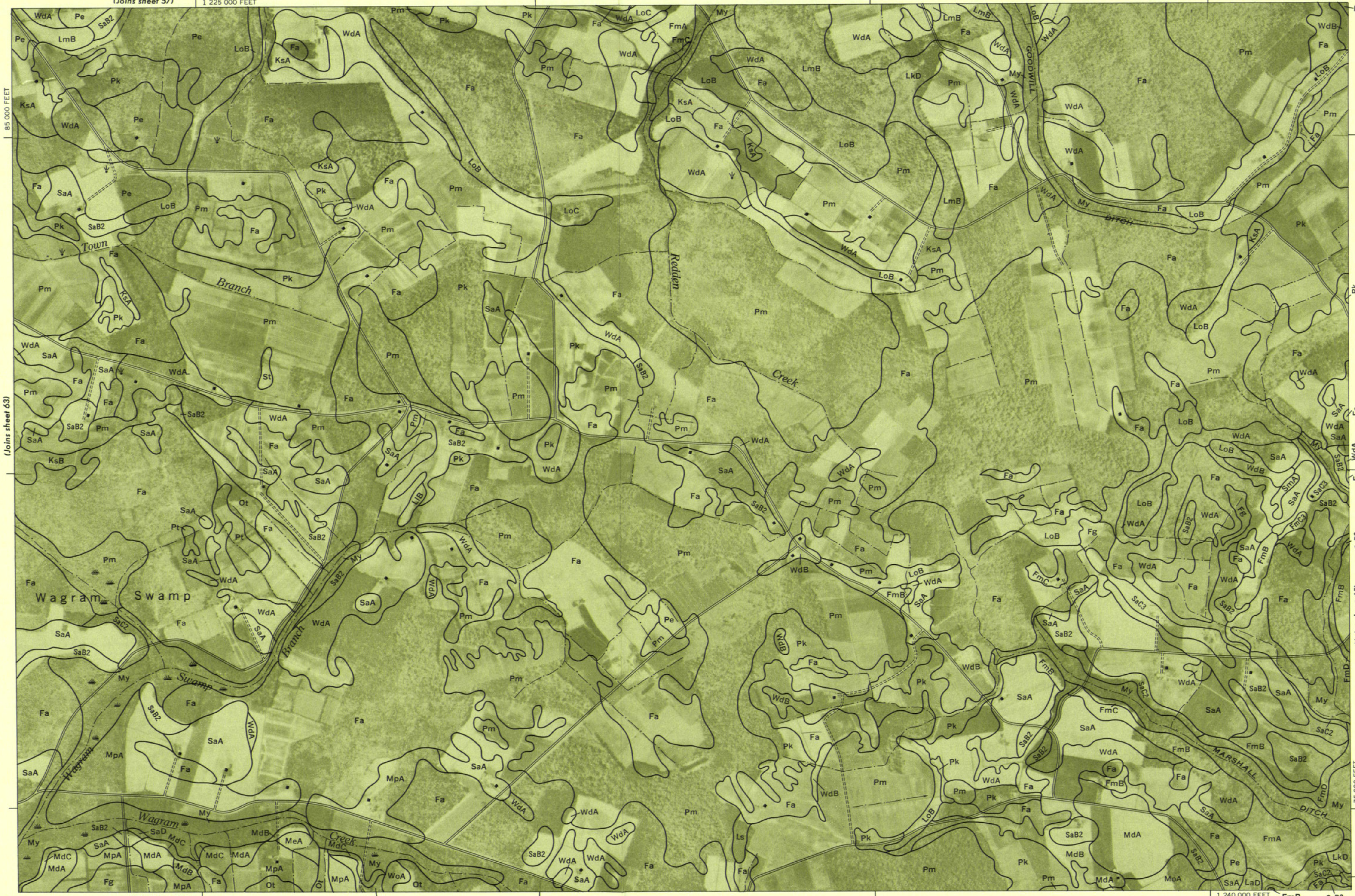
WORCESTER COUNTY, MARYLAND NO. 62



This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system. 1927 North American datum.

WORCESTER COUNTY, MARYLAND NO. 63

WORCESTER COUNTY, MARYLAND — SHEET NUMBER 64



N

1 Mile

5000 Feet

Scale 1:15840

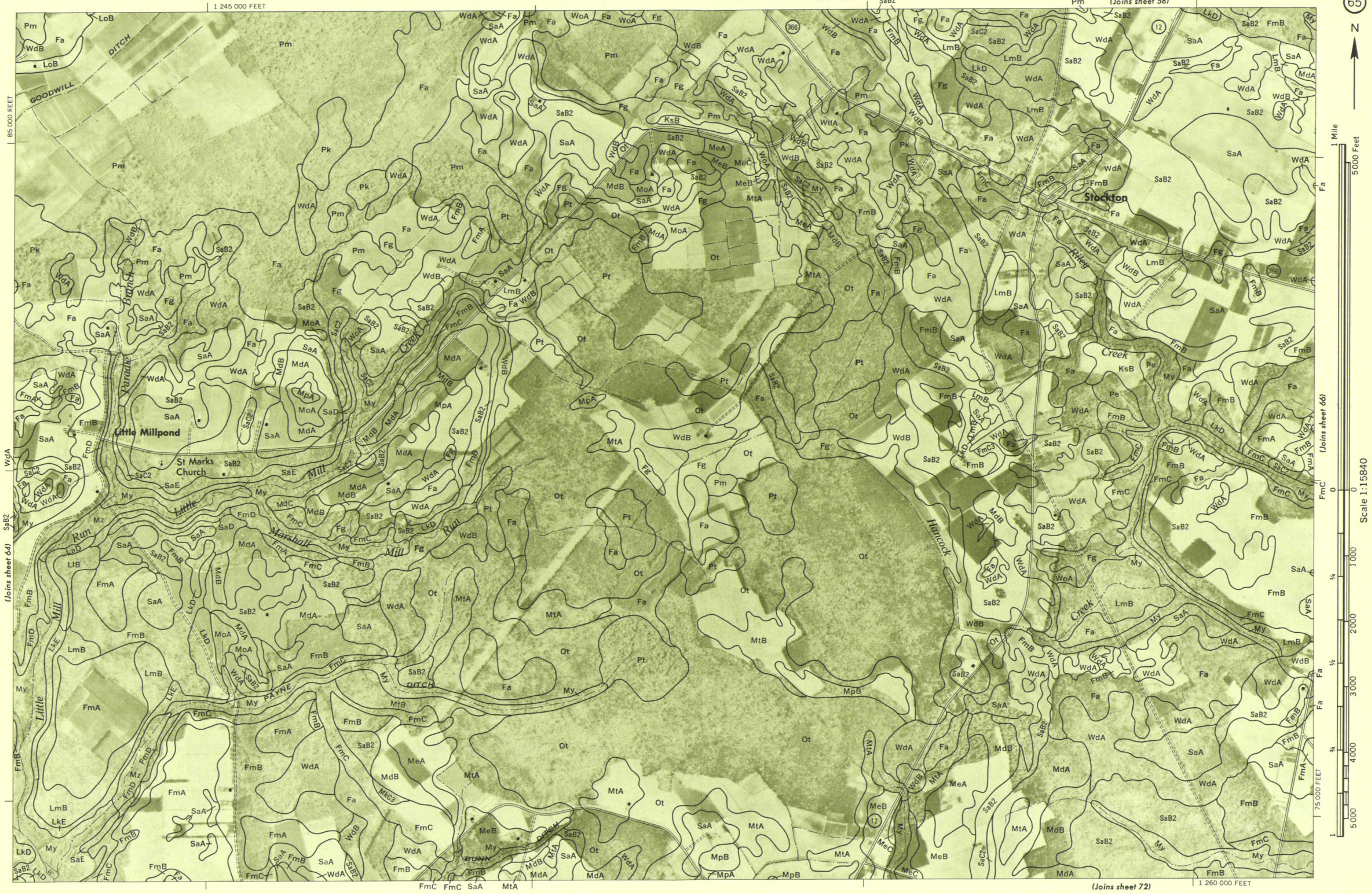
0 1000 2000 3000 4000 5000

Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system. 1927 North American datum.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

WORCESTER COUNTY, MARYLAND NO. 64

WORCESTER COUNTY, MARYLAND — SHEET NUMBER 65



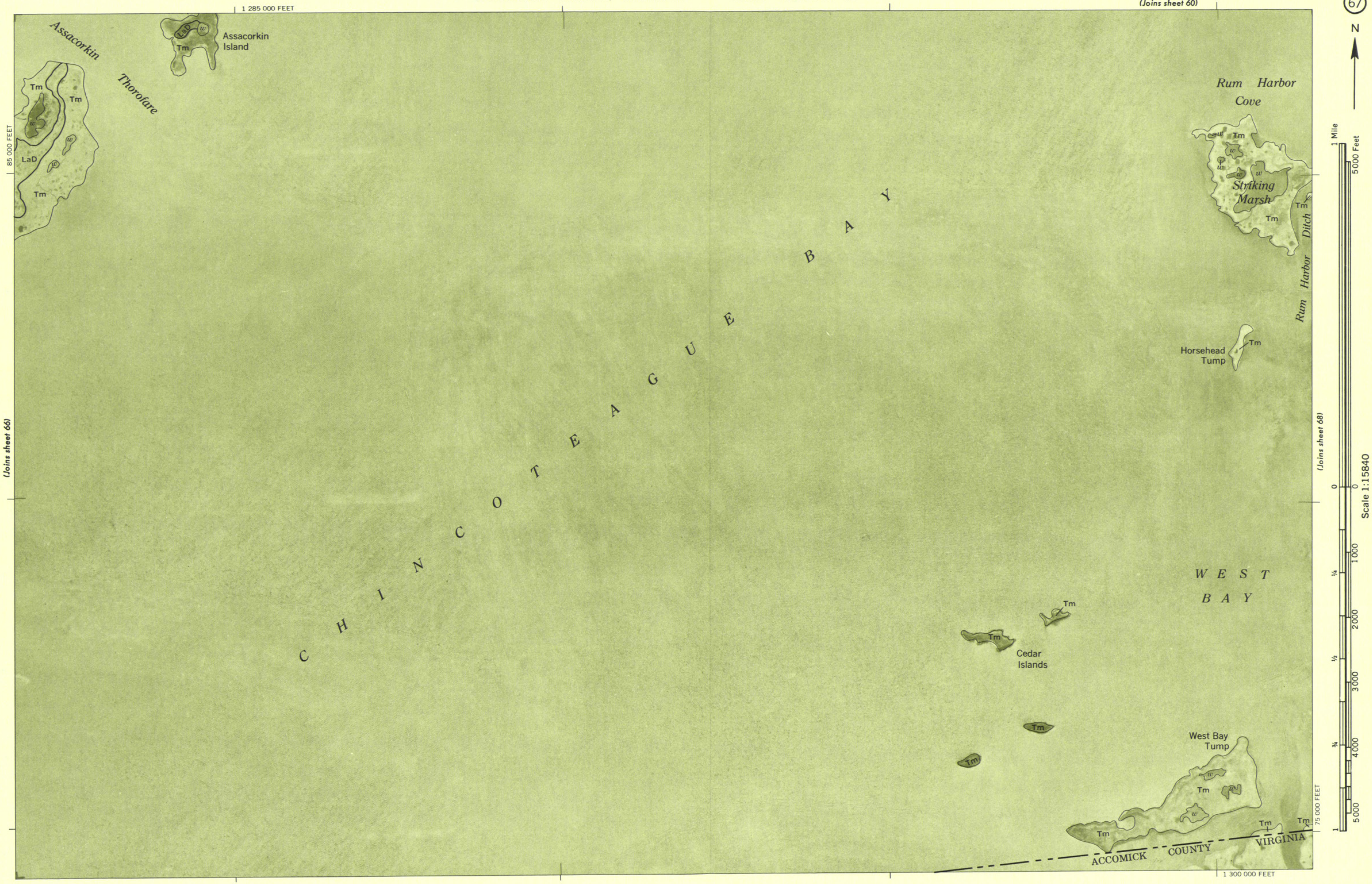
This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system. 1927 North American datum.

WORCESTER COUNTY, MARYLAND NO. 65

Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system. 1927 North American datum.

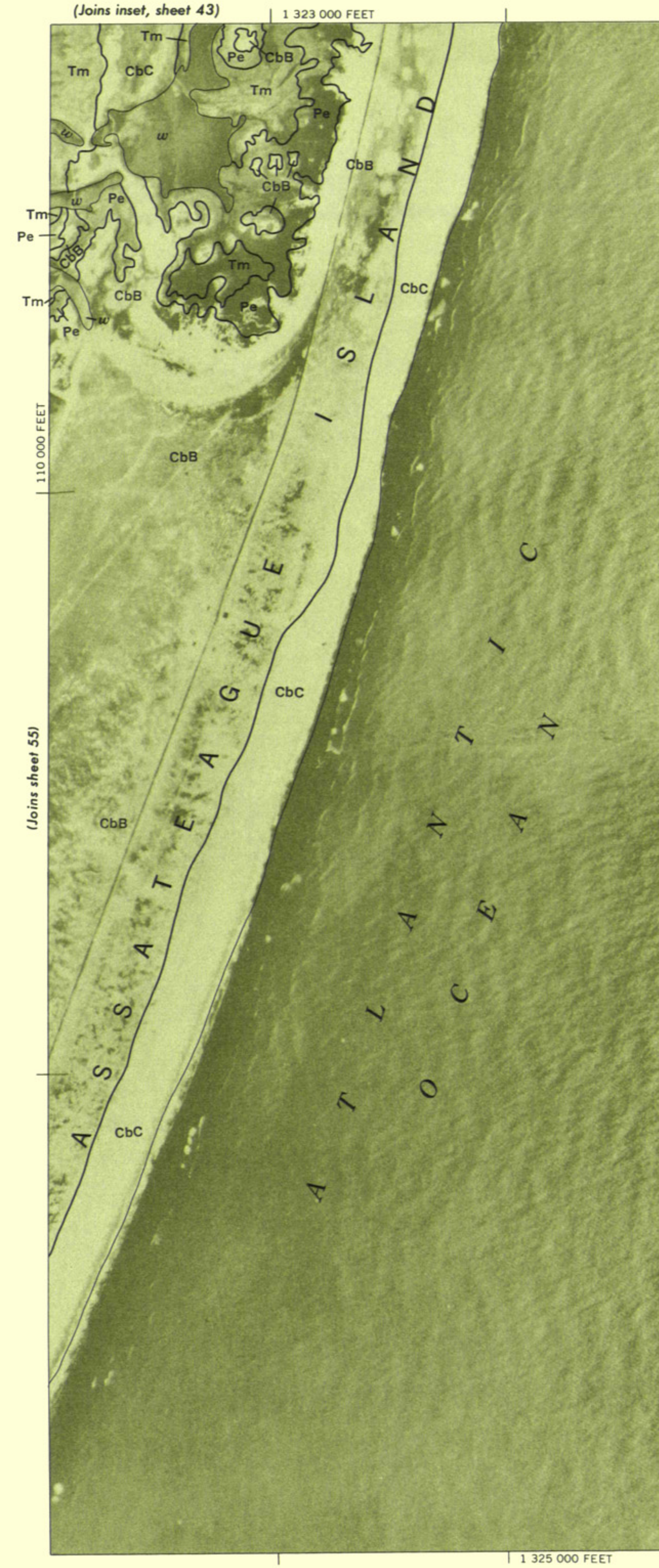
This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

WORCESTER COUNTY, MARYLAND NO. 66



This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system. 1927 North American datum.

WORCESTER COUNTY, MARYLAND NO. 67



WORCESTER COUNTY, MARYLAND NO. 68

Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

N

1 Mile
5000 Feet
Scale 1:15840
0 ¼ ½ ¾ 1
0 1000 2000 3000 4000 5000

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment station.
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

WORCESTER COUNTY, MARYLAND NO. 7

N

Scale 1:15840

1 Mile
5000 Feet
0
1000
2000
3000
4000
5000
¼
½
¾
1

N

Scale 1:15840

1 Mile

5000 Feet

0 1000 2000 3000 4000 5000

0 ¼ ½ ¾ 1

Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system. 1927 North American datum.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

N

1 Mile
5000 Feet
Scale 1:15840
0 1000 2000 3000 4000 5000
0 ¼ ½ ¾ 1

WORCESTER COUNTY, MARYLAND NO. 71

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.

Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.
This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

WORCESTER COUNTY, MARYLAND — SHEET NUMBER 8

WORCESTER COUNTY, MARYLAND NO. 8

Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system. 1927 North American datum.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.

This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Maryland Agricultural Experiment Station.
Photobase from 1964 aerial photographs. 5,000-foot grid ticks based on Maryland plane coordinate system, 1927 North American datum.